

INFORMATIONAL AND CONTROLLING SELF-INITIATED FEEDBACK
AND THE MEDIATING EFFECTS OF ANXIETY:
A TEST OF COGNITIVE EVALUATION THEORY

By

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This research directly tested cognitive evaluation theory, specifically its differentiation between informational and controlling feedback and the theory's position that individuals need to be self-determined and exhibit competence. Additionally, the mediating effects of anxiety on the interpretation of feedback was examined. Fifty-five participants were recruited from Sport and Fitness classes and randomly assigned to one of five experimental groups: (a) self-initiated informational feedback, (b) self-initiated controlling feedback, (c) externally initiated informational feedback, (d) externally initiated controlling feedback, and (e) no-feedback control group. Participants performed a non-dominant hand basketball shooting task during three experimental sessions. Feedback performance was given in two separate formats, informational and controlling. The dependent measures of interest were performance, technique, acquisition, intrinsic motivation, anxiety, self-determination, and competence. Results revealed that informational feedback groups outperformed the other experimental

groups. Technique scores for the externally initiated controlling feedback group were detrimentally affected in comparison to the other groups. Skill acquisition scores also revealed that the self-initiated informational feedback group outscored all other groups. Technique acquisition scores showed that the self-initiated informational feedback group acquired a higher level of skill than all of the groups except for the externally initiated informational group. Results from the behavioral measure of intrinsic motivation revealed that the self-initiated informational feedback group spent more time during the free-choice period on the non-dominant hand task than did the other groups. The self-initiated feedback group also requested more feedback than the self-initiated controlling feedback group. Examination of the self-report findings revealed that as predicted the self-initiated informational feedback group scored significantly higher on the intrinsic motivation questionnaire than did the no-feedback control group. Additional self-report findings revealed that both of the self-initiated feedback groups exhibited higher levels of competence than did the no-feedback control group. Overall, these findings provide support for cognitive evaluation theory's differentiation of feedback set on measures of performance, technique, acquisition, and behavioral measures of intrinsic motivation and self-determination. In light of the critical role that intrinsic motivation plays in the acquisition of expertise, this research is crucial in the development of a better understanding of the mechanisms underlying intrinsic motivation.

CHAPTER 1 INTRODUCTION

Recently, the veracity of findings suggesting that rewards adversely affect intrinsic motivation have come under question (Eisenberger & Cameron, 1996). The meta-analysis undertaken by Cameron and Pierce (1994) strongly conflicts with the social cognitivists' beliefs that deficits in intrinsic motivation follow the reinforcement of a behavior. Behavioral theorists have long argued against the detrimental effects of rewards (Mawhinney, 1979; Staw, 1975). Behaviorists favor the use of reinforcement principles to explain detriments in motivation (Hopkins & Mawhinney, 1992). Both the social cognitivists' (Rummel & Feinberg, 1988; Tang & Hall, 1995; Wiersma, 1992) perspective as well as the behaviorists' (Cameron & Pierce, 1994) perspective have been supported by meta-analysis findings. These incongruent results are related to the theoretical assumptions proposed by each perspective concerning intrinsic motivation.

Deci and Ryan (1985) have defined intrinsic motivation as the energizing force that directs our behaviors to exhibit competence and self-determination. Motivation refers to the process of directing, energizing, and sustaining behavior (Schunk, 1996). Motivation has been identified as a crucial factor due to its influence on learning, performance, and persistence (Duda, 1989; Vallerand, Deci, & Ryan, 1987).

Because of the influential role of motivation in many aspects of everyday life, it has been studied extensively by scholars and educators. Motivational research has far telling

consequences, as the findings reporting the detrimental effects of rewards, reinforcement, and feedback on intrinsic motivation and task persistence have been applied in such areas as education, the business world, and athletics. With regard to sport, sport psychologists are generally interested in the psychological factors that influence the degree of involvement in sport as well as adherence and achievement (Williams & Straub, 1986). Sport participation has grown dramatically during the 1990s. Worldwide, more than 200 million people are active in sports, including more than 30 million Americans (Roberts, 1993).

Over the past 20 years, researchers have investigated the effects of rewards, reinforcement, and feedback on intrinsic motivation. This concentrated effort towards understanding the relationship among rewards, reinforcement, feedback, and intrinsic motivation has produced two theoretical perspectives. Social cognitivists describe intrinsic motivation as being based on the observation that human beings are innately driven to be self-determined and to exhibit competence. On the other hand, behaviorists suggest that behaviors are influenced by particular stimuli and reinforcers. The social cognitive perspective is guided by cognitive evaluation theory (Deci & Ryan, 1985). This theory specifies that there are basic needs for competence and self-determination that energize individuals to interact with their environment. Therefore, needs are considered prior to action as a means to exert control over behavior and environment (Deci & Ryan, 1985). In contrast, the behaviorist perspective emphasized that behavior occurs through an interaction between physiological drives and environmental stimuli. These theorists suggested that intrinsic motivation is a matter of stimuli function and that if the correct

variables such as reinforcers and consequences are accounted for, then too would be intrinsic motivation. They also claimed that behavior is determined by the rate of reinforcement not intrinsic motivation (Dickinson, 1989; Flora, 1990; Mawhinney, 1990) .

Behavioral Perspective

Cameron and Pierce's (1994) recent meta-analysis indicated that intrinsic motivation was not diminished in many situations following the reinforcement of a behavior. They reported that rewards did not negatively affect attitude and that individuals receiving verbal praise reported greater interest than individuals not receiving verbal praise. Additionally, tangible rewards were found to have a positive effect when they were contingent on a pre-determined level of performance. Cameron and Pierce proposed that constructs such as self-determination and intrinsic motivation were unclear and a more appropriate method would be to investigate the effects of rewards and reinforcement on behavior.

Behavioral theorists have suggested that the notion that rewards cause decrements in motivation can easily be explained by the basic tenets of classical conditioning (Dickinson, 1989; Eisenberger & Cameron, 1996; Flora, 1990; Mawhinney, 1990) and that the decrements in intrinsic motivation occur only under highly constrained circumstances. Dickinson (1989) stated that intrinsic motivation may be a form of conditioned reinforcement, where the stimuli associated with the behavior have been associated with positive affect. Additionally, Flora (1990) has questioned the social cognitive theorists' basic assumption regarding the existence of an innate motivation that is not based solely on the three-term contingency of behavior analysis (discriminative

stimulus, behavior, and contingent reinforcement). The discriminative stimuli in the three-term contingency affords the individual information concerning reinforcement following the completion of the appropriate behavior. A behavioral perspective would suggest that only when rewards function as discriminative stimuli previously paired with an unpleasant outcome would a detriment in intrinsic motivation be expected. So, if rewards, reinforcement, or feedback operate as discriminative stimuli that have been paired in the past to a behavior that was not reinforced, then a reduction in intrinsic motivation would be expected.

Social Cognitive Perspective

In contrast to the behaviorists' view, Deci and Ryan (1980, 1985, 1991) proposed cognitive evaluation theory based on the assumption that humans have an innate need to exhibit competence and self-determination. Deci and colleagues have repeatedly found rewards to be detrimental to intrinsic motivation and an individual's need to demonstrate competence and autonomy (e.g., Deci, 1971, 1972a; Fabes, 1987; Lepper, Greene, & Nisbett, 1973; Pinder, 1976; Swann & Pittman, 1977).

One of the basic tenets of cognitive evaluation theory, *Proposition III* (Deci & Ryan, 1985), is that "events relevant to the initiation and regulation of behavior have three aspects that may be differentially salient to different people...these aspects are labeled the *informational*, the *controlling*, and the *amotivating* aspects; and it is the relative salience of the three aspects to a person that effects changes in perceived causality and perceived competence, and that alters the person's intrinsic motivation" (p.63). Researchers have examined this proposition with various groups and settings, including university students

(Ryan, Mims, & Koestner, 1983), grade school children (Kast & Conner, 1988; Koestner, Ryan, Bernieri, & Holt, 1984), collegiate athletes (Ryan, 1980), and musicians (McAllister, 1995). In the majority of these studies, significant differences have been found in the effects of the informational versus the controlling aspects of feedback information on intrinsic motivation. Moreover, pilot research conducted for this proposal found significant differences between informational feedback and controlling feedback on free-choice time. However, some incongruent findings exist, such as McAllister's (1995) inability to obtain significant differences in intrinsic motivation when comparing the effects of informational and controlling feedback.

In addition, attempts to differentiate informational feedback and controlling feedback have come under question recently. Indeed, Cameron and Pierce (1996) argued that research conducted to analyze the differences between informational feedback and controlling feedback have been inadequate because of the lack of an appropriate no-feedback control group for comparison purposes. Furthermore, Tang and Hall (1995) did not find any significant findings between the different feedback dimensions (informational or controlling) in their meta-analysis of the effects of rewards on intrinsic motivation. An additional issue concerning the validation of the differentiation between informational and controlling feedback is that very little of this research has been conducted using motor tasks. Beyond a few studies that used a stabilometer task (Vallerand & Ried, 1984; Weinberg & Jackson, 1979), no other studies reported using movement based tasks. However, for findings to be generalized to athletic settings, tasks more characteristic of

the behaviors individuals participate in for physical fitness and sport competition need to be incorporated.

New Approach

The basic conflict between social cognitivists' and behaviorists' positions implies the need for a different type of methodological approach that might help resolve some issues. Comparing self-initiated versus externally initiated feedback is one possible avenue of research because such a comparison provides an indirect examination of autonomy, a basic tenet of cognitive evaluation theory. Cognitive evaluation theory suggests that autonomous individuals are more intrinsically motivated (Deci & Ryan, 1985).

Extensive research has been completed on the effect of externally provided feedback on the learning of motor tasks (e.g., Bilodeau, 1966; Salmoni, Schmidt, & Walter, 1984; Weiss, Ebbeck, & Rose, 1992; Young & Schmidt, 1992). However, recently researchers have begun to investigate the influence of self-initiated feedback schedules on the learning of motor tasks (Janelle, Barba, Frehlich, Tennant, & Cauraugh, 1997; Janelle, Kim, & Singer, 1995). These studies have shown that self-initiated feedback schedules are more effective than passively received feedback in the learning of motor tasks (Janelle et al., 1997; Janelle et al., 1995). More specifically, groups receiving self-initiated knowledge of performance have exhibited higher achievement when compared to groups receiving other various feedback schedules.

Research on the self-administration of rewards or feedback schedules has produced equivocal findings. For instance, Dollinger and Thelen (1978) found that when good player awards were self-administered by the children participating in an activity, intrinsic

motivation was significantly decreased. DeLamarter and Krepps (1982) reported similar findings, although no other-administered reward group served as a comparison. On the other hand, two sets of investigators have found that self-administered rewards failed to undermine intrinsic motivation (Enzle & Look, 1979; Margolis & Mynatt, 1979). On the surface, these results (e.g., Enzle & Look 1979; Margolis & Mynatt, 1979) seem incongruent with other findings (e.g., DeLamarter & Krepps, 1982; Dollinger & Thelen, 1978) that have reported a reduction in intrinsic motivation when rewards are self-administered.

Ryan (1982) interpreted these results differently concluding that self-administered rewards and feedback are similar to externally administered rewards and feedback in that they can be either informational or controlling, depending upon the functional significance to the learner. This point emphasizes the importance of the person's interpretation. An individual's ability to interpret feedback appropriately is at the heart of cognitive evaluation theory. Additionally, simply affording control over the administration of rewards and feedback may affect self-determination, and correspondingly influence intrinsic motivation.

The concept of self-administered feedback also relates to research concerning the development of expertise. Glaser (1996) identified three interactive phases in the development of expertise (a) external support, (b) transition, and (c) self-regulation. Briefly, external support refers to the early acquisition of skills through the support of coaches and parents. The transition stage is the gradual reduction in outside support which he described as "decreasing scaffolding of environmental supports" (Glaser, 1996, p. 305).

Self-regulation occurs when individuals gain control over their learning environment, enabling them to structure their surroundings to optimize learning by controlling the amount and duration of practice. The increased autonomy acquired by individuals when presented with a self-initiated informational situation feedback should enable them to increase their rate of skill acquisition, leading to a more rapid progression through the first two phases of skill acquisition. Allowing more control over personal development would be expected to enhance the learning process while under the guidance of a knowledgeable coach or teacher. The reduction of a need for expert instruction, or the reduction in scaffolding as described by Glaser (1996), has been confirmed in a pilot study undertaken for this proposal. The results indicate a reduction in the rate of feedback requested over three testing sessions. Consequentially, the scaling of feedback was examined in the present study.

A knowledge of performance paradigm was proposed to test the validity of one of the basic tenets of cognitive evaluation theory (Deci & Ryan, 1985) by differentiating feedback sets (informational, controlling, and amotivational). Because the differentiation of feedback sets is an integral assumption of cognitive evaluation theory, any test of this basic tenet provides evidence concerning its validity. Additionally, the knowledge of performance paradigm will provide valuable evidence to substantiate the social cognitivists' position regarding an individual's need to be self-determined through the interpretation of the amount of feedback requested. Cognitive evaluation theorists' suggest that because of the need for self-determination and the need to exhibit

competence, individuals who are more intrinsically motivated request more feedback regarding their performance (technique).

Resolutions of Issues

From the perspectives of both the social cognitivists and the behaviorists the effects of rewards, reinforcement, and feedback can be explained. Whether through the innate need to be autonomous and exhibit competence or through the designations of the interdependency of the behavior-environment interaction, both perspectives are able to explain deficits in intrinsic motivation following the application of rewards and feedback.

One intriguing point that should be addressed is the ability of these theoretical positions to predict behavior. Behavioral scholars suggest that at the basis of behavior is the expectancy of reinforcement. So to predict behavior, one must first understand the reinforcement capabilities of the environment as well as expectancies for reinforcement of the behavior prior to being able to speculate regarding future behavior. These propositions make the testing of their position using a dynamic motor task highly constrained. On the other hand, cognitive evaluation theory has also operationalized intrinsic motivation in such a manner that nearly any results are interpretable. However, they argue that there is a differential effect of informational feedback and controlling feedback on an individual's need to be autonomous and exhibit competence which in turn affects intrinsic motivation. Based on Ryan's (1982) constructs of informational and controlling feedback, the present proposal directly tests cognitive evaluation theory's differentiation of feedback as well as indirectly testing its position on self-determination.

Additional questions remain concerning the use of a appropriate control groups (Cameron & Pierce, 1994). The current research examines these issues while incorporating a no-feedback control group and a novel motor task providing a test of cognitive evaluation theory's validity beyond the previously tested cognitive tasks.

An important point regarding research of cognitive evaluation theory's position on intrinsic motivation and the differentiation of feedback relates to the operation of intrinsic motivation. Discrepancies have been identified between free-choice measures and paper and pencil measures on intrinsic motivation. Early attempts to relate findings from self-report questionnaires and free-choice times measures have been equivocal (Harackiewicz, 1979; Luyten & Lens, 1981). In 1982, Ryan developed the Intrinsic Motivation Inventory (IMI) in an attempt to develop a subjective measure of intrinsic motivation. While the IMI subscale of interest and enjoyment was not found to be significantly related to free-choice behavior, a significant differentiation between informational and controlling feedback was identified on the IMI subscale evaluating the participant's effort. In the pilot study conducted for this proposal, significant differences between informational and controlling feedback were reported, but the IMI subscales data failed to reveal significant differences. These findings stimulate interest concerning possible mediating factors involved with the decrements found in intrinsic motivation.

One possible mediating variable is evaluation apprehension. Evaluation apprehension is the hypothesis that an audience can create anxiety and arousal over the evaluation of an individual's performance (Cottrell, Wack, Sekerak, & Rittle, 1968). However, this effect only occurs when the audience is seen as potentially evaluating or

competing against the individual performer. Cottrell (1972) proposed that evaluation apprehension was a learned response that served as a conditioned stimulus to the anticipated positive or negative outcomes regarding performance. Expectations of negative outcomes may produce feelings of anxiety. Because of these feelings of anxiety, evaluation apprehension is considered a state of anxiety (Geen, 1989).

Recently, Jones (1991) suggested that the effects of anxiety depend on the subjective interpretation of the individual. He proposed a debilitating/facilitative continuum to explain the intrapersonal effects of anxiety. He reported support of the debilitating/facilitative model in a number of studies comparing the directional effects of anxiety between elite and non-elite athletes. Jones (1995) concluded that the primary mediator of the debilitating and facilitative model is the amount of control an individual is able to exert over themselves and their environment. In summary, Jones suggested that individuals who are self-determined would be more inclined to interpret anxiety in a facilitative manner. A multidimensional perspective of anxiety, as well as Jones' debilitating/facilitative model, lends itself well to the investigation of the mediational effects of anxiety on intrinsic motivation. Further, Reeve and Deci (1996) have suggested that other mediating variables outside of their model may affect motivational situations and the effects of anxiety as proposed by Jones (1991) in a multidimensional model are theoretically aligned because of the importance each model places on the individual's control over the environment.

Consequently, the use of a research paradigm that focuses on the effect of different feedback sets on intrinsic motivation serves as a direct test of cognitive evaluation theory.

Also, this research provided an indirect test of the presence of intrinsic motivation based on the amount of feedback requested by the experimental groups, while examining the mediating effects of anxiety and arousal on the differentiation between information feedback versus controlling feedback and the corresponding effects on performance and learning. Additionally, the scaling of feedback as defined by Glaser (1996) as a reduction in the need for outside sources of performance information as an individual acquires expertise was investigated.

Statement of the Problem

The purpose was to compare self-initiated informational and self-initiated controlling feedback on intrinsic motivation, performance, and learning of a motor task (i.e., non-dominant hand basketball hook-shot). A self-initiated knowledge of performance feedback schedule was used to make inferences concerning the validity of differentiated feedback sets based on the amount of feedback requested by two of the experimental groups (i.e., self-initiated informational and self-initiated controlling). Measures of cognitive anxiety, and somatic anxiety were evaluated as they relate to the mediation of the effect of informational feedback versus controlling feedback.

Hypotheses

The following hypotheses were tested:

1. The self-initiated informational feedback group should exhibit higher intrinsic motivation than the no-feedback control group as measured by free-choice time, and composite and subscales scores on the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989). It was also expected that the self-initiated controlling

feedback group, and the externally initiated informational feedback group, would be detrimentally influenced by the feedback set in comparison to the no-feedback control group. Further, the externally initiated controlling feedback group should exhibit the largest reduction in intrinsic motivation. The support for this hypothesis is twofold. First, based on cognitive evaluation theory, self-initiated feedback should cause an increase in the participant's perception of control over the learning environment. This increase in perceived control over behavior is expected to increase autonomy and intrinsic motivation (Deci & Ryan, 1980, 1985, 1991). Ryan, Mims, and Koestner (1983) reported that positive feedback within an informational context increased intrinsic motivation more than positive feedback within a controlling context.

Based on cognitive and behavioral learning strategies studies, self-regulated strategies were expected to contribute to the enhanced perception of control, which also have been found to facilitate learning (Hardy & Nelson, 1988; McCombs, 1989; Schneider & Pressley, 1989; Seigler, 1991; Watkins, 1984; Zimmerman, 1989). Learned helplessness research also provides support for this hypothesis by demonstrating that when performance outcome becomes non-contingent (loss of control) on behavior, a state of helplessness occurs (Seligman, 1975). This conclusion was especially pertinent in predicting what happened to the externally regulated knowledge of performance groups in the study.

2. The self-initiated informational feedback group should exhibit higher performance and technique scores than the other experimental groups and the no-feedback control group across the ten trial blocks. As well as exhibiting higher acquisition scores

during the acquisition blocks on the technique and performance measures in comparison to the other experimental groups and the no-feedback control group. Researchers have demonstrated that self-initiated knowledge of performance compared to other types of knowledge of performance schedules leads to greater accuracy in performance and technique ratings on non-dominant hand throwing tasks (Janelle et al., 1997; Janelle, Kim, & Singer, 1995). Feedback that enhances competence should elevate motivation and influence performance positively (e.g., Bandura, 1986; Deci, 1975; Deci & Ryan, 1985; Harter, 1978; Lepper & Greene, 1978). In fact, Vallerand and Reid (1984) demonstrated that positive verbal feedback increased performance on a stabilometer task while negative verbal feedback decreased performance when compared to a no-feedback condition.

3. The self-initiated informational feedback group should request more feedback than the self-initiated controlling feedback group. Based on Deci and Ryan's (1985) *Proposition 1*, participants in the self-initiated informational group should request the most feedback based on their ability to exhibit control over their feedback. The ability to exert control over the feedback process should increase feelings of self-determination. In addition, consistent with cognitive evaluation theory, informational feedback should serve to enhance intrinsic motivation. These particular dimensions of feedback (informational or controlling; self-regulated or externally regulated) and the interactions hypothesized in this study, have not been previously evaluated in the study of motivation.

Cognitive evaluation theory predicts that controlling feedback reduces the perception of self-determination, thus influencing the level of intrinsic motivation, possibly to the point of amotivation (Deci & Ryan, 1980, 1985, 1991). Furthermore, informational

feedback was expected to increase intrinsic motivation by elevating feelings of autonomy and competence (Deci & Ryan, 1980, 1985, 1991).

4. The self-initiated informational feedback group should exhibit significantly higher facilitative directional scores of anxiety (cognitive & somatic) as measured by the Competitive State Anxiety Inventory - 2 (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990) than the other experimental groups and the no-feedback control group. In addition, the self-initiated controlling feedback group, and the externally initiated informational feedback group, would be detrimentally influenced by the feedback set in comparison to the no-feedback control group. Further, the externally initiated controlling feedback group should exhibit the largest reduction in intrinsic motivation. According to Jones' (1991) model of the directional interpretation of anxiety, individuals experience the cognitive and physiological symptoms of anxiety on a debilitating/facilitative continuum. Conceptually suggesting that individuals perceiving themselves in control over themselves and the environment, perceive anxiety in a more facilitative fashion.

5. Requests for feedback were expected to decrease over the experimental sessions for both of the self-initiated feedback groups. Glaser (1996) concluded that as individuals progress through the three phases related to the development of expertise, the less dependent they become on outside sources of performance feedback. He noted that the "self-regulation phase," is a state characterized by the person exerting control over his or her environment. This point supports the reduction in feedback requests as progress is made in the acquisition of skill. Pilot research examining the amount of feedback requested by participants also supports this hypothesis.

6. The self-initiated informational feedback group should exhibit higher scores on self-determination and competence subscales of the Activity-Feeling States (AFS; Reeve & Sickenius, 1994) in comparison to the no-feedback control group. The self-initiated controlling feedback group and the externally initiated informational feedback group should be detrimentally influenced in comparison to the no-feedback control group on the self-determination and competence subscales. Further, the externally initiated controlling feedback should be expected to exhibit the largest reduction in scores on the self-determination and competence subscales.

According to cognitive evaluation theory, the self-initiated informational feedback group should display enhanced levels of self-determination and competence. By allowing the individuals control over their learning environment and informational feedback perceptions of self-determination and competence should be increased. Consequently, individuals should exhibit increased levels of intrinsic motivation and performance. Furthermore, the inability of the externally initiated controlling feedback group to control their learning environment detrimentally influences their perceptions of self-determination and competence and increasing their perceptions of tension (Deci & Ryan, 1980, 1985, 1991).

Assumptions

For the purposes of this investigation, the following assumptions were made:

1. The random assignment of the participants into groups sufficiently equated baseline interest and ability to achieve in the motor task.

2. The amount of feedback requested by each participant in the self-initiated feedback groups was an appropriate measure of the need to be self-determined and to exhibit competence. It afforded the participant's the opportunity to exert control over the skill acquisition process through the initiation of feedback. For participants to exhibit competence, they requested more feedback so that they can acquire the skill more rapidly.

3. Intrinsic motivation is a construct that can be accurately evaluated by the dependent variables (IMI and free choice time). The development of the IMI and the use of a free-choice time variable have been used in previous research for the purposes of examining the construct of intrinsic motivation (Deci, 1971; McAuley et al., 1989; Ryan, 1982; Ryan et al., 1983).

4. The manipulation of the feedback for the informational and controlling groups was strong enough to override baseline levels of intrinsic task motivation. The differentiation of feedback was successful because it has been effectively used in previous motivational research (Kast & Conner, 1988; Koestner et al., 1984; Ryan, 1982; Ryan et al., 1983).

For the studies limitations and definition of terms see Appendixes A & B.

Significance of the Study

Recent research has drawn attention to the influence of rewards on intrinsic motivation and achievement. Cognitive evaluation theorists staunchly argue that rewards administered in a controlling manner detrimentally influence intrinsic motivation. The counter argument made by behavioral theorists is that any decrements in intrinsic motivation following the administration of rewards and feedback can be easily explained

by the basic principles of behavioral analysis. Specifically, Cameron and Pierce (1996) stated that "the only negative effect of reward on intrinsic motivation occurs under circumscribed set of conditions, namely, when rewards are tangible and promised to individuals without regard to any level of performance." Additionally, some behaviorists (Barnes, 1989; Flora, 1990) have questioned what they call hypothetical constructs such as intrinsic motivation. However, cognitive evaluation theorists suggest the controlling aspects of feedback are detrimental to intrinsic motivation.

Many studies in academic environments have been conducted in which the relation of rewards to intrinsic motivation, task persistence, and achievement have been examined. However, never have the relationships between self-initiated versus externally initiated feedback, and intrinsic motivation been explored. The cognitive evaluation theorist's position that concerns the existence of a need to be self-determined and exhibit competence has only been inferred by the definition of the term intrinsic motivation. The present study examined this issue, by offering participants an opportunity to initiate feedback regarding their performance. By investigating different forms of feedback and the resultant effects on intrinsic motivation, the findings of this study provide useful information for teachers and students, as well as coaches and athletes. Examining combinations of self- versus externally initiated schedules and informational feedback and controlling feedback, helps to identify strategies that enable highly motivated individuals to maintain high levels of motivation that are inherently necessary to attain a high level of performance.

Questions regarding the operationalization of intrinsic motivation were also addressed through the investigation of the possible mediation of evaluation apprehension on the informational feedback and controlling feedback groups and the corresponding effects on intrinsic motivation. Previous findings, including the pilot study for this proposal, were unable to find significant relationships between feedback set and scores on the IML. This inability of researchers to consistently relate free-choice measures and subjective self-reports led to the inclusion of evaluation apprehension as a mediating variable in this proposal.

This study provides sport psychology and motor learning researchers with ideas for examining the relationship between the effect of informational feedback versus controlling feedback, and self-initiated versus externally initiated feedback and the mediating effects of evaluation apprehension on intrinsic motivation, persistence, and achievement. In addition, the amount of feedback was examined with regard to the perspective of the importance of perceived ability and the need to be self-determined by exerting control over decisions influencing learning. Finally, this research provides an additional perspective concerning the question about the effect of the type of feedback on intrinsic motivation and the social-cognitivist assertion of the need for self-determination and self-competence.

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter contains pertinent literature that is divided into separate sections covering the basic tenets and research related to both cognitive evaluation theory and the behaviorist theory approaches to motivation. Additionally, research dealing with anxiety, self-regulation and the attainment of expertise will be reviewed. Research findings on the effects of various forms of knowledge of performance on performance will also be presented. Finally, the literature review will be integrated into a summary.

Cognitive Approach

Cognitive evaluation theory is one of the three mini-theories that comprise Deci and Ryan's (1985) all encompassing self-determination theory. Cognitive evaluation theory provides the theoretical framework for the current research. The theory is based on two primary premises (a) perceived causality and (b) an individual's perceived competence. Perceived causality is an extension of Rotter's (1966) concept of internal versus external locus of control, as well as deCharms (1968) concept of "origins" and "pawns." The second premise, perceived competence, is an extension of the locus of causality concept, which deals with an individual's ability to be an effective agent in the environment. The concept of locus of causality refers to the source of the initiation of a behavior. When an individual's personal desire or interest initiates behavior, the locus of causality is perceived as being internal. On the other hand, behaviors that are initiated by

an outside source are seen as being having an external locus of causality. Perceived competence extends deCharms' (1968) and White's (1959) position that humans are primarily motivated to effectively change their environment. In essence, there is an innate drive to demonstrate capabilities, capacities, efficiencies, and skills when interacting with the environment. These two assumptions, perceived causality and perceived competence, form the foundation of Deci and Ryan's (1975, 1985) theoretical explanation for the influence of external events on intrinsic motivation.

Deci (1975) first proposed cognitive evaluation theory in an attempt to integrate early findings of the effects of rewards, feedback, and other forms of reinforcement on intrinsic motivation. Monetary rewards were found to have detrimental effects on intrinsic motivation (Calder & Staw, 1975; Deci, 1971; Deci, 1972a; Pritchard, Campbell, & Campbell, 1977). Other research indicated that participants receiving evaluative feedback exhibited less intrinsic motivation than those who did not (Amabile, 1979; Smith, 1974). Deci and Ryan continued to refine the theory in an attempt to explain the effects of events that initiate and regulate motivationally relevant behavior. They offered four propositions related to the instigation and reinforcement of behavior as the basis for cognitive evaluation theory. Only the first three propositions are relevant to this current research.

The first proposition addresses a person's need to be self-determined. It states that "external events relevant to the initiation or regulation of behavior will affect a person's intrinsic motivation to the extent that they influence the perceived locus of causality for that behavior" (Deci & Ryan, 1985, p. 62). The basic premise is that when an individual's perception of control over behaviors or events are seen as being outside of her or his

control, thus undermining self-determination, intrinsic motivation can be expected to be influenced adversely. However, events and behaviors that are considered to be under personal control, represent an internal locus of causality, presumably increasing self-determination and thereby are expected to increase intrinsic motivation.

An individual's perception of the location of causality is assumed to be related to the extent that behavior is self-determined. Incidents that are perceived to have an internal locus of causality are proposed to increase intrinsic motivation and strengthen autonomy. On the other hand, events that are perceived to be external in causality tend to undermine intrinsic motivation and to control behavior. These events that are perceived as externally controlled are identified as controlling behaviors and have been found to reduce creativity (Amabile, 1979), decrease self-esteem (Deci & Ryan, 1985), and produced a detrimental effect on cognitive flexibility (McGraw & Fiala, 1982).

The second proposition states that "external events will affect a person's intrinsic motivation for an optimally challenging activity to the extent that they influence the person's perceived competence, within the context of some self-determination" (Deci & Ryan, 1985, p. 63). Essentially, events and behaviors that promote an individual's autonomous perception of perceived competence are expected to increase intrinsic motivation. Conversely, events and behaviors that are perceived to be externally controlled or which do not promote perceived competence can have a detrimental effect on intrinsic motivation. In essence, perceived competence will increase when positive feedback is received in activities that are believed to be self-determined. Thus, an increase in intrinsic motivation is related to perceived competence when the behavior is perceived as being

self-determined. Decreases in intrinsic motivation, however, can be experienced when failures occur within a self-determined context or the context is controlling in nature.

The third proposition included in cognitive evaluation theory relates to the events that initiate and regulate behavior. Deci and Ryan (1985, p. 64) propose that "events relevant to the initiation and regulation of behavior have three potential aspects, each with a functional significance." The three considerations are informational, controlling, and amotivational. Informational factors facilitate the internal control and perceived competence of behaviors and events, thereby enhancing intrinsic motivation. Controlling factors enhance perceptions of external locus of control; by doing so, they undermine intrinsic motivation. Amotivating factors lead to a perception of a lack of any control over one's environment. Therefore, intrinsic motivation is undermined when amotivational factors are present. Additionally, this proposition asserts that the practical implications of any of three aspects of cognitive evaluation theory is specific for the individual to determine. Specifically, what one individual finds informational another may find controlling.

The third proposition is based on research generally indicating that providing positive feedback (Deci, 1971) and affording individuals choices (Zuckerman, Porac, Lathin, Smith, & Deci, 1978) have been found to be informational, thus increasing perceptions of self-determination and intrinsic motivation. On the other hand, rewards (Deci, 1972b) and deadlines (Amabile, DeJong, & Lepper, 1976) have been interpreted as controlling. Additional support for the differentiation in the functional significance of feedback comes from Kast and Conner (1988). Using a mixed feedback condition in which

participants were offered both informational and controlling feedback, they identified gender differences. Males interest scores in the word search puzzle solving task were significantly higher than females following the introduction of the mixed feedback condition.

In 1971, Deci first used a free-choice measure to evaluate intrinsic motivation. He investigated the effect of monetary rewards on the intrinsic motivation of college students who participated in three sessions of building-block puzzle exercises. Intrinsic motivation was assessed during the first and third sessions. Free-choice measures involved the participants being surreptitiously observed during a period of time when the puzzle solving behaviors were not being rewarded. The experimental and control groups were differentiated in that the experimental participants received \$1 for each of the puzzles that they solved in the allotted time (other than free-choice time). The results were indicative of the detrimental effect caused by the introduction of the monetary reward. Essentially, the introduction of the monetary reward seemed to undermine the intrinsic motivation that the experimental participants exhibited in the first session.

In earlier research paradigms, free-choice time was typically used to measure levels of intrinsic motivation. Subsequently, a paper and pencil measure to assess intrinsic interest was developed by Ryan (1982). He used a post-experimental questionnaire in an attempt to cross validate the earlier free-choice time findings. Ryan studied the factors of task- versus ego-involvement, informational and controlling feedback, and self- and other- administered feedback on performance and intrinsic motivation while administering a puzzle solving task. He reported a main effect for feedback, which revealed that

participants receiving controlling feedback were significantly less intrinsically motivated as measured by free-choice time. The only other significant free-choice finding was the interaction between informational feedback and task involvement. Participants in the task involvement and informational condition were significantly more intrinsically motivated in comparison to the other conditions.

The post-experimental questionnaires were analyzed comparing the three independent variables and participants' subjective ratings of interest, enjoyment, tension, pressure, and effort. Contrary to Ryan's (1982) expectations, no significant effects were found for either interest or enjoyment, although significant findings were reported for tension, pressure, and effort. Tension and pressure ratings were higher for task-involved participants. While individuals in the controlling feedback condition reported exerting less effort in the puzzle activity than informational feedback participants. Further, a significant interaction was reported between feedback and administration. Participants in the informational group exerted more effort than the controlling group when the feedback was administered by an outside source. Data from this study failed to reveal a relationship between the free-choice measure and the questionnaire on effort and interest. However, differences in informational and controlling feedback were found, thus offering support for cognitive evaluation theory.

Further, Ryan, Mims, and Koestner (1983) extended previous research on the development of a self-report instrument to assess intrinsic motivation using a 26-item questionnaire. They, too, examined constructs such as interest, enjoyment, pressure, and tension. Principal component factor analysis revealed two strong factors; the first one

relating to interest and enjoyment and the second item relating to pressure and tension. When the factors making up interest and enjoyment were averaged and correlated with the free-choice measure, a significant correlation of .42 was found. Previous researchers have not consistently found this relationship. Harackiewicz (1979) found a positive relationship, while Luyten and Lens (1981) were unsuccessful using brief post-experimental questionnaires. Interestingly, while a relationship between the dependent variables of intrinsic motivation was found (self-report and free-choice time), only the free-choice measure was able to significantly differentiate between the effects of informational and controlling feedback. Additionally, main effect results proved significant for feedback. Participants who received controlling feedback reported perceiving significantly more pressure and tension than informational participants.

In summary, Ryan, Mims, and Koestner (1983) reported supporting evidence for cognitive evaluation theory by identifying the detrimental effects of rewards presented in a controlling format. Furthermore, they provided an extension of Ryan's (1982) earlier work on the existence of a relationship between behavioral measures of intrinsic motivation and self-report measures.

The development of a paper and pencil measure for intrinsic motivation was extended by McAuley, Duncan, and Tammen (1989). They examined the psychometric properties of the Intrinsic Motivation Inventory (IMI) (Ryan, 1982) in a sport setting. More precisely, the construct validity of the questionnaire was tested within a sport setting. Undergraduates in physical education classes participated in a variation of the basketball shooting game commonly referred to as "horse." Four subscales of the 16-item

version of the questionnaire were evaluated for internal consistency; interest-enjoyment ($\alpha = .80$), competence ($\alpha = .87$), effort-importance ($\alpha = .84$), and tension-pressure ($\alpha = .68$). All alpha coefficients levels were adequate, as was the overall level of internal consistency for the IMI ($\alpha = .85$).

Two conclusions of the work conducted by McAuley, Duncan, Tammen (1989) are of particular interest here. The first relates to the conclusion that the IMI measures both specific components and the general construct of intrinsic motivation. Additionally, the items are worded in such a manner that a researcher can substitute the appropriate specific wording for the task or activity of interest. These conclusions give researchers the opportunity to evaluate intrinsic motivation with a self-report instrument specifically adapted for any task.

Numerous studies have been conducted with regard to the effect of differential feedback (i.e., informational vs. controlling) sets. Ryan, Mims, and Koestner (1983) examined the effect of informational and controlling feedback on college students on a puzzle solving task. Results reported that controlling feedback undermined intrinsic motivation in comparison to informational feedback. Positive feedback administered in an informational manner significantly enhanced intrinsic motivation when compared to a no-feedback condition. On the other hand, the group receiving positive feedback administered in a controlling manner did not exhibit an increase in motivation. Kast and Conner (1988) examined the effect of informational versus controlling feedback on the intrinsic motivation of grade school children. The controlling feedback group had significantly lower levels of intrinsic motivation when compared with both the informational feedback

group and the no-feedback control group. In an additional study on the effects of differential feedback sets on the intrinsic motivation of musicians, McAllister (1995) was unable to replicate previous findings. No differences in effect on intrinsic motivation were noted between informational and controlling feedback conditions. However, the majority of results in various studies support cognitive evaluation theory's position of the differentiation of informational versus controlling feedback.

A few researchers have examined intrinsic motivation using sport-related activities. In the 1970's, it was reported that intrinsic motivation was undermined by the use of rewards (Halliwell, 1979; Orlick & Mosher, 1978; Thomas & Tennant, 1978). In another sport-related investigation, Vallerand and Reid (1984) appraised the effect of positive and negative verbal feedback on intrinsic motivation on a stabilometer task, and demonstrated that positive verbal feedback increased intrinsic motivation relative to negative verbal feedback and the no-feedback condition. Weinberg and Jackson (1979) reported similar findings using success and failure feedback.

In summary, cognitive evaluation theory has been used extensively to investigate the effects of rewards, reinforcement, and feedback on intrinsic motivation. Additional, attention was given to studies examining the proposed differentiation between informational and controlling feedback sets. While the majority of the research has been conducted in academic environments, a few investigations using motor tasks were identified. All in support of cognitive evaluation's approach. This brings us to the theoretical perspective of the behaviorist.

Behaviorist Approach

When compared with the social-cognitivist perspective, the behaviorist approach theoretically opposes the existence of any intrinsic motivation. For instance, Flora (1990) stated "a complete scientific account for any behavior of any organism may be obtained with a complete description of the functional interdependency of the behavior-environment interaction" (p. 323). Additionally, Bandura (1986) stated that "more exclusionary criteria than persistence without noticeable incentives are needed to substantiate intrinsic motivation" (p. 111). This theoretical stance is based on Skinner's original work defining the three-term relationship; discriminative stimulus, response, and reinforcing stimulus (as cited in Flora, 1990). Behaviorists claim that social-cognitivists have only evaluated two of the three terms (i.e., discriminative stimulus and response), and that they speculate with regard to the consequence of reinforcing stimuli (Flora, 1990).

In a recently published meta-analysis, Cameron and Pierce (1994) provided the latest impetus for the behaviorist attack on the extensive empirical findings of a decrease in intrinsic motivation following the administration of rewards and other forms of feedback and reinforcement. This analysis included 96 between-group designed studies in which reward sets and controls were compared on different measures of intrinsic motivation. The results indicated that, contrary to previous findings, rewards did not generally influence intrinsic motivation. The one affirmation of the detrimental effect of rewards and other forms of feedback and reinforcement on intrinsic motivation appeared when expected tangible rewards were given for task completion. In their discussion, Cameron and Pierce (1994) argued that advocates of cognitive evaluation theory would have little difficulty

reconciling their results. They based this claim on the assumption in cognitive evaluation theory that competence and autonomy underlie intrinsic motivation. The relationship that competence and autonomy have in how reinforcement or rewards are perceived as either informational, controlling, or amotivational is the basis of the proposed detrimental effect on intrinsic motivation. Cameron and Pierce reported that the real problem for cognitive evaluation theory is when considering the self-report measures attributed to intrinsic motivation. In previous research, attitudinal measures of interest, enjoyment, and satisfaction have been identified that are said to characterize intrinsic motivation (McAuley et al., 1989; Ryan, 1982; Ryan et al., 1983). One way to assess changes in intrinsic motivation is through a questionnaire. Cameron and Pierce (1994) concluded that intrinsic motivation measured by attitude change was not negatively affected by rewards. The only difference identified was that the participants who received verbal praise reported greater interest in the experimental behavior than the no-reward treatment participants.

Recently, the operational definition of intrinsic motivation has come into question. Wiersma (1992) reported conflicting findings in a meta-analysis examining the effects of extrinsic rewards on intrinsic motivation. Wiersma noted that the reported effect of rewards or reinforcement on intrinsic motivation depended on how intrinsic motivation was operationalized. Free-choice measures revealed a detriment in intrinsic motivation while, on the other hand, attitudinal measures were not always congruent with free-choice measures. Additionally, free-choice measures showed a decline in intrinsic motivation while there was an increase in performance measures. This lack of relationship between these operational constructs of intrinsic motivation belies the need for further research to

explore the relationship between reinforcement, free-choice time, and performance. Social cognitive theorists argued that these differences in measures are a function of the concept of self-determination (Rigby, Deci, Patrick, & Ryan, 1992). They asserted the importance of the participant's autonomy, and this reaffirms the significance of the type of reinforcement given; whether it is in an informational manner, a controlling manner, or an amotivational manner.

Beyond concerns of an individual's autonomy, Eisenberger and Cameron (1996) addressed the question of the effects of rewards on intrinsic motivation. They reiterated the behaviorist position that, by using the basic fundamentals of operant conditioning, rewards can be applied without any detrimental effect on intrinsic motivation. Eisenberger and Cameron identified three possible situations that could be misconstrued as evidence of the detrimental effects of reinforcements or rewards. The first situation that could be misreported as a reduction in intrinsic motivation occurs when the participant becomes satiated following repeated performance attempts. The basic interpretation of satiation is that the participant becomes bored with the task. The second situation which could be mistaken for a decrease in intrinsic motivation has been identified as "negative contrast" (Williams, 1983). Researchers have suggested that a sudden withdrawal or reduction in reinforcement causes a negative affective reaction. This "negative contrast" has been reported by both Bandura (1986) and Flora (1990).

Finally, Eisenberger and Cameron (1996) noted that rewards given independently of performance lead to the participant's perception of a loss of control over the reward or reinforcement. This loss of control may manifest itself in performance decrements and may

therefore be mistakenly interpreted as a reduction in intrinsic motivation. Eisenberger and Cameron (1996) offered a learned helplessness theory explanation as support for their conclusion. From a cognitive evaluation theory perspective, the loss of control or autonomy produces a deficit in intrinsic motivation which is also manifested in performance reductions.

Rebuttal to Cameron and Pierce's Meta-Analysis

Lepper, Keavney, and Drake (1996) offer strong points of contention concerning Cameron and Pierce's (1994) meta-analysis. They asserted that this conflict between behaviorists and social-cognitivists is not a new one. Moreover, they stated that most scholars are biased to a particular paradigm, and that the use of a meta-analysis does not insure objectivity in making conclusions about a particular issue.

The strongest argument made by Lepper, Keavney, and Drake (1996) was their identification of the focus of Cameron and Pierce's (1994) analysis as an examination of the overall effects of rewards or reinforcement. They failed to differentiate reward and reinforcement types to identify a generalized effect. Lepper, Keavney, and Drake stated that there is a total neglect of the last 20 years of research demonstrating the differing effects on intrinsic motivation as a function of different reward sets. Specifically, Cameron and Pierce averaged data from different reward sets that, in the original studies, produced expected interaction effects. By doing so, presumably the researchers were able to disguise the original effects caused by differing reward and reinforcement sets.

According to Lepper, Keavney, and Drake (1996), rewards and reinforcers can serve three theoretically distinctive functions: (a) incentive or instrumental, (b) information

or feedback, (c) or constraint. Reinforcers and rewards can alter behaviors by influencing expectations of future reinforcement or rewards following task completion, task success, or task persistence. In this manner, a sense of task mastery or competence can be altered. Additionally, perceptions of self-determination or personal control versus extrinsic control can be affected by the distinctive functions of rewards and reinforcers. Lepper, Keavney, and Drake's position with regard to the differing effects of reinforcement provides strong support for propositions concerning the importance of self-determination and competence.

Differential Feedback Research

Ryan (1982) proposed that feedback could be interpreted as being informational or controlling. Consequently, the effect feedback has on intrinsic motivation is determined by whether the feedback is perceived by the receiver as being informational or controlling. As defined by cognitive evaluation theory, controlling feedback may be interpreted by the individual as pressure to achieve a certain outcome. Informational feedback, on the other hand, imparts positive effectance information that is offered to improve performance but does not convey pressure to achieve a certain outcome.

Early studies in which the effect of feedback on intrinsic motivation was investigated resulted in equivocal findings. Smith (1974) found that positive feedback decreased intrinsic motivation. Whereas, Weiner and Mander (1978) reported increases in intrinsic motivation resulting from positive feedback. A more in-depth look revealed the possible intervening factors resulting in these incongruent findings. In Smith's (1974) study, the participants were instructed that their performance would be evaluated, thus reducing their control over the outcome. The inclusion of an evaluation of performance in

the Smith (1974) study caused the positive feedback to be interpreted in a controlling manner reducing intrinsic motivation. On the other hand, Weiner and Mander (1978) did not involve any performance evaluation in their study.

Further investigation of the effects of feedback on free-choice time was conducted by Pittman, Davey, Alafat, Wetherill, and Kramer (1980). Their findings supported the differential effects of controlling feedback when compared with informational feedback. The controlling and informational feedback groups differed in that the controlling group was subjected to performance outcome feedback. This exploitation of performance-contingent feedback served to increase the controlling nature of the feedback and may have resulted in a decrease in intrinsic motivation.

Ryan (1982) extended the supporting evidence for the detrimental effects of controlling feedback on intrinsic motivation. With college students and a hidden-figures task, Ryan manipulated feedback by using the term "should" for those participants in the controlling group. An example of the controlling information from Ryan's study includes: "Good. You're doing as you should" (Ryan, 1982, p.454). In comparison, the informational feedback groups were informed about their performance compared with the maximum and average performances. Ryan's results, supported the earlier findings of Pittman et al.(1980) indicating that controlling feedback undermined intrinsic motivation. Kast and Conner (1988) conducted a replication of this study with school children and word-search puzzles. They found a significant decrease in intrinsic motivation in the controlling feedback group when compared with both the informational feedback and the no-feedback groups. Interestingly, Ryan (1982) compared self- versus other-administered

and controlling versus informational feedback manipulations. These data were important because not all of the crucial feedback individuals receive is administered by others. In fact, in most movement situations, some form of intrinsic feedback is available and crucial. The following section will include research in which self- versus other-administered rewards have been empirically compared.

Self vs. Other Administered Rewards

Up to this point, this review of the literature has included a survey of the effects of rewards and feedback administered by someone other than the receiver. However, intuition leads scholars to suggest that the self-administration of rewards and feedback should have a positive effect on self-determination and would, in turn, positively influence intrinsic motivation (Deci & Ryan, 1985). Furthermore, this line of theorizing has been followed by reinforcement theorists shifting their focus from other-administered to self-administered reinforcements (Bandura, 1986).

Research associated with self- and other-administered feedback or reward schedules has reported conflicting findings. Dollinger and Thelen (1978) examined the effects of feedback schedules on children when they were instructed to self-administer "good player" awards. The self-administered feedback group indicated a reduction in intrinsic motivation when compared with other-administered and no-reward groups. Additionally, DeLamarter and Krepps (1982) examined the effects of the self-administration of tokens by college students working on a puzzle-solving task. They showed a detriment in intrinsic motivation when the self-administered group was compared with a no-reward control group. This study provided evidence for less intrinsic

motivation when rewards were self-administered. However, it was not an appropriate test of the question regarding the differentiation between self- and other-administered feedback groups because there was not an other-administered group for comparison. While this research is attractive, the findings were not as robust as they appear because of the absence of an other-administered feedback group.

Findings reported by Margolis and Mynatt (1979) and Enzle and Look (1979) conflict with the previously mentioned work in that an increase in intrinsic motivation following the self-administration of rewards. Margolis and Mynatt (1979) tested the effects of the self-administered rewards on the intrinsic motivation of children while playing with toys. When compared with an other-administered feedback group, the self-administered feedback group exhibited significantly greater intrinsic motivation. Enzle and Look (1979) replicated these findings using a sample of college students.

In an effort to reconcile these contrasting findings, Ryan (1982) demonstrated that by controlling rewards and feedback, there is an inclination to undermine intrinsic motivation as compared to merely providing informational feedback. Results of his study using a hidden figure task indicated that informational feedback has a positive effect on the intrinsic motivation of college students. These findings supported the existence of the differential effect of feedback sets, regardless, of whether the feedback was self- or other-administered. Ryan argued that his findings supported cognitive evaluation theory. Specifically, a clear distinction between the effect of informational feedback and controlling feedback on intrinsic motivation was identified.

In conclusion, the absence of a no-feedback control group in these studies has limited the ability to shed light on the relative effect of feedback set on a baseline measure of intrinsic motivation. A no-feedback group, which will be included in the present study, allows a clear test of the relationship between informational versus controlling feedback and intrinsic motivation.

Evaluation Apprehension

The complexity of findings concerning intrinsic motivation suggests that there may be other elements of the motivational situation that affect intrinsic motivation. Reeve and Deci (1996) concluded that the presence of others in the experimental environment may increase the extent which an event could be perceived as being controlling. Audience effects can elicit either an increase or decrease in performance. This social facilitation effect is one of the most frequently studied topics in social psychology (Gill, 1986), and it was first identified by Triplett (1898) who reported that cyclist's recorded faster times when paced versus unpaced. One possible driving mechanism behind social facilitation is evaluation apprehension which proposes that an audience can create anxiety and arousal over the evaluation of an individual's performance (Cottrell et al., 1968).

Zajonc (1965) proposed a drive theory perspective to account for social facilitation effects. He stated that the presence of others creates drive or arousal and that the increased arousal will raise the likelihood that the dominant response will be exhibited. Additionally, Zajonc argued that if the skill to be performed is well learned or simple, the probability of appropriate execution of the dominant response is increased. However, if

the skill is complex and not well learned, then the dominant response is not the correct behavior, and performance will be impaired.

Cottrell and colleagues (1968) questioned Zajonc's conclusion that the mere presence of others was sufficient to invoke arousal. Instead they stated that the effect of social facilitation only creates arousal when the audience has the ability to evaluate performance. This evaluation apprehension is what creates arousal and anxiety. Burwitz and Newell (1972), and Martens and Landers (1972) have validated the role of evaluation apprehension in social facilitation. Cottrell (1972) stated that evaluation apprehension is a learned response that can be paired with positive or negative outcomes relating to an individual's performance. Expectations of a negative outcome results in the individual experiencing fear, anxiety, and increased arousal. Moreover, Geen (1989) proposed that if evaluation apprehension arises from fear of a negative outcome then it can be considered as a state increased arousal and anxiety.

Recently, Hardy and his associates have proposed a cusp catastrophe model of anxiety and performance that suggests that an interactive effect exists between cognitive anxiety and physiological arousal (Fazey & Hardy, 1988; Hardy, 1990). Physiological arousal has been suggested to influence performance through two mechanisms; (1) activation and the availability of resources, and (2) interpretation of physiological symptoms (Hardy, 1990; Hardy & Parfitt, 1991; Hardy, Parfitt, & Pates, 1994). Activation and resources availability are said to directly effect performance. Researchers have reported that physiological arousal is associated with anaerobic power (Parfitt, Hardy, & Pates, 1995). However, physiological arousal can also influence performance

indirectly through the subjective interpretation of the physiological symptoms by the individual (Jones, Hanton, & Swain (1994).

This recent introduction of the directional interpretation of anxiety by Jones and his colleagues (Jones, 1991; Jones & Swain, 1992) has afford researchers a continuum from debilitating to facilitative to examine the experiential direction of anxiety. Further, Jones et al. (1994) developed an modified version of the Competitive State Anxiety Inventory - 2 (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990) to examine the direction of anxiety in a facilitative or debilitating manner. The CSAI-2 proposes a multidimensional approach of anxiety and sports performance, delineating anxiety into cognitive and somatic components. Thereby, allowing researchers to examining the relative effects of both components of anxiety. Jones et al. (1994) using a modified version of the CSAI-2 found no significant differences between cognitive and somatic anxiety in elite and non-elite swimmers. However, they did find that elite swimmers interpreted anxiety to be more facilitative than the non-elite swimmers. Moreover, Jones and Swain (1995) reported that high level performers were more likely to view anxiety in a facilitative manner.

With regards to intrinsic motivation, the acknowledgment of the intrapersonal interpretation of anxiety that has been reported to influence performance is an issue that should not be overlooked. Within the cognitive evaluation theory framework it is possible that the effect of differential feedback sets is mediated by anxiety related to evaluation apprehension. Jones (1995) proposed a model of debilitating and facilitative competitive anxiety in which he emphasized that individuals strive to exert control over themselves and

the environment. This ability to wield control over the environment can be described as self-determination. Thus, the more self-determined individuals are, the more facilitative they would be expected to interpret anxiety. As a means of managing anxiety, self-regulation would increase individuals control over their environment, thereby, reducing their debilitating interpretation of anxiety. Therefore, by utilizing the CSAI-2, this research will evaluate the mediating influence of anxiety on the relationship among feedback sets and intrinsic motivation, performance, and learning. While the interactive effect of cognitive anxiety and physiological arousal will be evaluated, the modified CSAI-2 will investigate the directional effects of anxiety.

Self-Regulation Research

Self-regulation is the extent that individuals are able to exert motivational and behavioral control over their own learning environment (Zimmerman, 1994). Research has indicated enhanced performance in various tasks when self-regulated learning strategies are used (Schneider & Pressley, 1989; Seigler, 1991). Theorists have postulated that by allowing individuals to exert more control over their learning environment, the acquisition of critical information is significantly enhanced (Hardy & Nelson, 1988; Holt, 1982; Janelle et al., 1997; Zimmerman, 1989). Also, Singer and Chen (1994) noted that, self-regulated strategies are preferable to externally imposed plans because, at the very least the individual can initiate instruction from an expert when they considered it most necessary.

Self-regulation research has been associated with the processes that enable individuals to proceed through the stages of skill acquisition to higher levels of expertise.

The realization of expertise has been defined by Glaser (1996) as a change in agency. This entails the development of expertise as performance improves. At the onset of skill acquisition, most participants are deeply involved with some type of external support system. As competence increases, the amount of self-regulation over the learning situation increases and performance is fine-tuned. Glaser (1996) described three progressive phases related to the development of expertise: (a) external support, (b) transition, and (c) self-regulation.

The external support phase is characterized by the control and influence of outside sources, such as parents, teachers, and/or coaches. This phase is relevant to intrinsic motivation because of an individual's lack of autonomy. Lack of control over one's environment exaggerates the importance of the role of the parents, teachers, or coaches to insure a motivationally nurturing environment. In accordance with cognitive evaluation theory, a person in a position of expertise or control can help to promote intrinsic motivation in others by effectively mediating the source and type of feedback provided, encouraging them to be autonomous.

The transition phase is characterized by a reduction in the need for an external support system that was developed during the phase of acquiring a skill in a task. Glaser (1996) noted that this transition prompts the individual to increase the use of more self-monitoring techniques. It is important to realize that this phase is characterized by some guided learning from an individual with expertise, such as a coach. Additionally, within the guise of guided learning, self-monitoring is ideally promoted. This results in the

development of self-determination, which may coincide with an increase in intrinsic motivation.

The final phase in the acquisition of expertise is identified as self-regulation, in which the composition of the learning environment is mostly controlled by the learner. Subsequently, the environment is situated in such a way that individuals can procure feedback at their own rate. This enables individuals to adjust their learning environment to optimize the learning situation and make it optimally challenging. The option of acquiring expertise also remains available, allowing the individual to go to other competitors, coaches, and teachers for external support.

Closely aligned to Glaser's expertise acquisition phases (1996) are the stages of motor learning as proposed by Fitts and Posner (Fitts, 1964; Fitts & Posner, 1967). This model includes three phases related to the acquisition of motor skills: (a) cognitive, (b) associative, and (c) autonomous. The cognitive stage is identified as a period when the primary concern is the acquisition of knowledge pertaining to the skills and rules involved in the demonstration of a motor skill. Performance is usually erratic because of the increased need to process information while monitoring rule implementation.

During the associative stage, an attempt is made to identify the most efficient and effective practice conditions to acquire skill. It is during this phase that motor theorists (e.g., Adams, 1971; Fitts, 1964) proposed that individuals begin to identify patterns of movement with successful outcomes and significantly reduce their dependence on outside sources of performance information.

The autonomous stage is associated with an ability to perform without the assistance of an external prompt or guidance. A typical example of an automatic stage performer is when an elite athlete is able to make the most difficult motor task look easy to an observer. Additionally, because individuals participating at the autonomous stage use little processing capacity, they are able to identify and process information in the environment that the novice is not able to identify. Primary to the current research is how closely the acquisition of skill and expertise are aligned with a process that begins with an individual who is totally dependent on external sources for performance information and proceeds to an internally independent individual exhibiting competence in a complex task such as shooting a hook-shot.

These proposed phases in the acquisition of skill provide support for self-determination theory and, in doing so, cognitive evaluation theory from a discipline outside the usual theoretical umbrella of social cognition. The phases of acquisition of expertise recognize the importance of such constructs as the development of competence, autonomy, and guided learning, which are the bases for the support of cognitive evaluation theory and the proposed research.

Knowledge of Performance and Expertise

Knowledge of performance (KP) is defined as external feedback information directed toward the acquisition of the appropriate kinematics used for proper execution of a motor skill (Salmoni, Schmidt, & Walter, 1984). The majority of research in this area has employed simple motor tasks, and comparisons of the relative benefits of feedback sets (i.e., KP versus Knowledge of Results [KR]) have been equivocal. Speculation about

the equivalent findings has been based on the use of simple motor skills, which minimize the effectiveness of the KP feedback relative to other types of feedback (Janelle et al., 1997).

Newell and Walter (1981) argued that KR does not provide sufficient information for the acquisition of complex motor skills. Later, research in which complex motor skills were studied indicated that KP significantly increased performance in comparison to simply providing KR (Kernodle & Carlton, 1992). They used attentional cuing strategies and transitional information to help improve performance. These procedures were introduced because they allowed instructors (i.e., teacher, coach, or parent) to direct individuals to the most relevant performance information enabling them to begin regulating their own behavior. Similar research has reported that augmented attentional cuing strategies increased performance on motor tasks (McCullagh, Stiehl, & Weiss, 1990; Weiss, 1983; Weiss, Ebbeck, & Rose, 1992; Weiss & Klint, 1987).

As a means of motivational enhancement, the instructor can use transitional cues that direct the participant's attention to essential techniques and procedures to correctly perform an upcoming motor (Kernodle & Carlton, 1992; Newell, 1991). Research on self-regulation and the acquisition of expertise are closely aligned with the guidance of skill acquisition. To expedite skill acquisition, researchers have identified the importance of the availability of expert guidance, as well as, the individual being able to exert control over the learning process (Janelle et al., 1997; Janelle, Kim, & Singer, 1995; Zimmerman, 1989). Additionally, use of transitional cues should further increase the individual's ability to learn the essential components of complex motor skills.

This line of research provides further support for cognitive evaluation theory, particularly in that it stresses the importance of the individual learner taking control over the learning process. This is further supported by other researchers who reported that learning is increased with the application of self-regulated learning strategies (Chen & Singer, 1992; Singer & Chen, 1994). Introducing a KP design with an investigation of motivation will directly test Deci and Ryan's assumption of the need to be "self-determined" and exhibit "competence" through the analysis of the amount of feedback requested by each participant in the self-initiated feedback groups. A KP design offers individuals the opportunity to control their learning environment through self-initiated feedback.

Summary

This review presented evidence supporting cognitive evaluation theory's position on the detrimental effects of rewards and reinforcement. Thus, cognitive evaluation theory is the theoretical framework for the research being proposed. Additionally, an alternative perspective of the contribution made by rewards, and reinforcement was discussed under a behaviorist perspective. Behaviorists deny the existence of any internal constructs that instigate and sustain behavior such as intrinsic motivation. Cameron and Pierce's (1994) meta-analysis provided the recent impetus for the behaviorists' arguments for a reevaluation of the effects of rewards and reinforcement. Their arguments against intrinsic motivation were discussed and rebuttal points were provided. Lepper and colleagues (1996) countered that Cameron and Pierce's (1994) examination of the overall effect of rewards and reinforcers without regard for the differential effects of feedback as

hypothesized, neglects 20 years of research supporting the detrimental effects of rewards and reinforcement.

Cognitive evaluation theory proposes that reinforcement (i.e., feedback), when presented in a manner to allow the learner to exhibit competence and self-determination, will increase intrinsic motivation. Research from diverse disciplines was provided as support of the concepts that the learners need to exhibit competence and self-determination. Anxiety research was presented proposing that an individual's control over his or her environment mediates their interpretation of the effect of anxiety on performance. Research examining skill acquisition indicated the need of individuals to exhibit control over their learning process. Additionally, the phases of expertise acquisition were presented, and the manner in which an individual progresses from needing to acquire expertise from outside sources until they progress to a position of self-monitoring and expertise was described. KP research was also presented in support of the need of learners to take an active role in their learning experience. Finally, all of these perspectives were presented in terms of their relationship to cognitive evaluation theory, as well as how the perspectives were related to intrinsic motivation and the proposed research.

As means of investigating cognitive evaluation theory and its position on the differential effects of feedback information on intrinsic motivation, highly motivated participants will be afforded the opportunity to receive KP feedback to enhance their acquisition of a complex motor skill. The feedback will be manipulated among self- or other-initiated and between an informational or controlling format. This design will help to determine the influence of feedback set on intrinsic motivation, performance, and learning.

Also, the design will provide evidence regarding participants' need to exhibit competence and self-determination through the initiation of feedback.

CHAPTER 3 METHOD

In this experiment, the potential differential effects of informational versus controlling feedback and self-initiated versus externally initiated feedback were evaluated using intrinsic motivation, performance measures, and learning. Additionally, the mediating influence of anxiety on the acquisition of a complex motor task was assessed.

Participants

Fifty-five male participants were tested. The number of participants was calculated using Cohen's (1977) sample size tables and his recommendations for effect size and power. The values used to determine sample size were: $\alpha = .05$ (level of significance), $\beta = .8$ [Group (5-1) X Session (3-1)], $f = .40$ (effect size), and power = .80.

Participants were recruited from Sport and Fitness classes within the Department of Exercise and Sport Sciences at the University of Florida. To control for baseline intrinsic motivation differences, an initial screening process was used. One hundred-ten potential participants respond to a task specific version of the Intrinsic Motivation Inventory (IMI), and completed a descriptive questionnaire regarding their basketball experience and handedness. Only individuals scoring in the top 50 % on the IMI will be included in this study.

Task and Apparatus

Participants attempted to learn how to shoot a non-dominant hand basketball hook-shot (Paye, 1996). They were placed with their backs to the basket (45.72 cm wide with a backboard 121.92 cm high and 182.88 cm wide) 182.88 cm left of the center line of the testing area and 2 m from the front of the basket. Holding the basketball in their non-dominant hand, participants stood with their feet shoulder width apart and their knees flexed. Because all participants were right-handed, the task began with a small step with their right foot toward the center of the court followed by a step with the left foot, a second step with the right, and then a jump off of the right foot. Participants were instructed to dribble two times while stepping into the center of the key. Ideally, the right foot and right shoulder were pointed to the basket as they jump off the right foot. When the jump is initiated, the left arm takes the ball straight up from the hip to full extension directly over the left ear. All participants were instructed to aim for the front of the basket and were advised to let the ball roll off their fingertips so the shot is soft, with backspin.

To facilitate the most precise assessment of the technique used in the execution of the hook-shot, as well as the outcome, all sessions were videotaped. A video camera was placed at the top of the key, perpendicular to the basket, allowing the camera a clear lateral perspective of the participants non-dominant hand hook-shot (technique score) as well as the basket (performance score). Pilot research revealed that this camera position was the most appropriate to provide an unobstructive full view of the task.

Procedure

Participants were randomly assigned to one of five experimental groups (11 per group): (a) self-initiated informational feedback, (b) self-initiated controlling feedback, (c) externally initiated informational feedback, (d) externally initiated controlling feedback, and (e) no-feedback control group. Three experimental sessions were conducted on separate days and all sessions were completed within a one week period.

Once participants were scheduled for testing, they were instructed to meet the experimenter at the Florida gym testing area. At the beginning of the first visit, each participant completed an informed consent form. Participants then completed a modified version of the CSAI-2 (Jones & Swain, 1992; Martens et al., 1990) and watched a videotaped model executing the non-dominant hand basketball task. The videotaped model demonstrated and the experimenter explained the appropriate technique needed to properly execute the expected motor task. Each participant was instructed on dribbling, foot work, and ball handling required to execute the appropriate non-dominant hand hook-shot (Paye, 1996). Participants were then given additional verbal instructions coinciding with group assignment (informational self-initiated, controlling self-initiated, informational externally initiated, controlling externally initiated, and no-feedback control). As a means of control for possible interference and motivational exchanges, at the beginning of each session participants in the no-feedback control group were instructed to wait quietly after attempting a shot. Participants were then asked if they had any questions regarding the proper technique in executing the task. After all questions were addressed the non-dominant hand shooting task began.

All participants completed three testing sessions, each on separate days, and the first two sessions were divided into 4 blocks of 10 shots. The third session involved 2 performance blocks followed by 1 acquisition block. After finishing the second block of each session, the experimenter excused himself from the testing area for a 5 min period using some type of a cover story (e.g., I need to call my next participant). A video camera was placed in a small window of a door perpendicular to the court. While leaving, the experimenter stated a standard instruction suggesting to the participants that they can either shoot around, practice, or relax and read some magazines or newspapers located adjacent to the testing area. During this period, all participants were surreptitiously videotaped through the window to determine the amount of time they spent practicing the non-dominant hand hook-shot. After the 5 min free-choice time period, the experimenter returned and participants completed the remaining 2 blocks, 20 more trials of hook-shots. During the third session, only one acquisition block was tested (10 trials) after the 5 min free-choice time period. Following the completion of each session, all participants completed the IMI and AFS before departing.

Feedback Manipulations

Participants assigned to the two self-initiated feedback groups were informed that after any trial they can initiate KP feedback. An intertrial interval of 15 s was used for all groups to provide ample time to process feedback; this intertrial interval was monitored by the experimenter. The feedback presented to the informational and controlling groups was different on two dimensions proposed by cognitive evaluation theory (i.e., self-determination and competence). Controlling feedback is characterized by instructions

concerning how an action “should” be executed (Ryan, Mims, & Koestner, 1983; Ryan, 1982). Therefore, additional evaluative performance feedback was provided to the controlling feedback groups. For example, “You did very well on that one, just as you should.” This feedback gave the participants comparative information regarding their performance. In contrast, non-evaluative feedback was offered to the informational groups regarding their performance (e.g., “You did very well on that one”). KP was given within the context of the participant’s group (informational or controlling). All KP and initial instructions were based on the technique instructions for the non-dominant hand hook-shot provided by Paye (1996). An example of informational KP feedback for a participant who is unable to perform the proper footwork would be “You did fairly well on that one. Next time, with your left hand dribble two times moving to the center of the key. You do this by leading with your right foot, stepping with your left foot and then jumping off your right foot.” An instance of similar KP within a controlling format is “You did fairly well that time, just as you should. Next time, with your left hand you should dribble two times moving to the center of the key. You should do this by leading with your right foot, stepping with your left foot and then jumping off your right foot.” (For detailed informational and controlling feedback statements, see Appendices C and D).

The two externally initiated feedback groups were instructed that at certain points during testing the experimenter will provide feedback. Participants in these groups (externally initiated informational feedback and externally controlling feedback) received feedback following trials that corresponded to when individuals in the self-initiated informational or self-initiated controlling feedback groups received feedback. This yoking

procedure dictated when feedback was provided. The experimenter administered feedback to the externally initiated groups in accordance to the individuals' technique needs. Participants in the no-feedback control group were instructed at the beginning of each session that no evaluative information would be provided during testing.

Dependent Measures and Experimental Design

The specific experimental design for each subheading is listed below. All statistical analyses were conducted with alpha set at .05. Post-hoc analyses (Tukey's Honestly Significant Difference) were conducted when appropriate. When based on a priori hypotheses contrast tests were conducted using the no-feedback control group for comparison.

Performance Scores

Performance measures were taken based on the accuracy of the non-dominant hand hook-shot. All of the experimental sessions were videotaped so that each shot attempt could be assessed. Videotaped performance of the non-dominant hand shot was evaluated on a scale of zero to four. A score of zero was awarded for a shot that did not make contact with the backboard or the rim (i.e., air ball). A one was recorded when a shot hit the backboard but did not make contact with the rim. A two represented a shot that hit the rim, although it was shot in such a way that there was a low probability of the ball going into the basket. A three was assigned to a shot that nearly went in, and a four was given to a made hook-shot. Scores were averaged across groups, trial blocks, and sessions. The scores were then evaluated using a 5 (Group) x 10 (Trial Block) ANOVA with repeated measures on the last factor.

Technique Scores

Shooting technique were evaluated on the basis of how well the participant's technique corresponded with the videotaped model. The experimenter then evaluated technique by analyzing videotape of each shot attempt. The videotapes were examined at five anatomical points derived from pilot research to acquire a composite technique score. The five points that were assessed included: (a) left hand dribble, (b) first step and footwork, (c) jumping off the correct foot, (d) position of right foot and shoulder at jump initiation, and (e) the extension of the left arm at release of the ball and ball rotation. Deductions for the dribbling technique point were assessed for the use of the dominant hand (-.10), and only one dribble (-.50). Individuals who were unable to execute any non-dominant hand dribbles received 0 points. The first step and footwork were evaluated by assessing a .25 point deduction for any step missed or added. Position of the right foot and shoulder at jump initiation was afforded .50 points, for the appropriate positioning of the shoulder and foot for the technique points for this phase. If the participant jumps off of the incorrect foot there was a .50 deduction, or a full point deduction for failing to jump at all. The last assessment was in regards to the participants' non-dominant arm extension and shooting technique. The extension of the arm accounted for .50 technique points, while the rotation of the ball from the fingers (i.e., backspin) accounted for .50 points. A maximum of one point and minimum of zero was assessed for each of the technique check points. Thus, the range of scores for each trial was between zero and five points. All point deductions were based on pilot research. These technique accuracy scores were averaged

across trial blocks, sessions, and groups. Differences in technique scores were determined using a 5 (Group) x 10 (Trial Block) ANOVA with repeated measures on the last factor.

Acquisition Scores for Skill and Technique

Scores from the fourth and eleventh trial block were averaged across trial block and analyzed. The fourth trial block was used because overall the participants had reached an early learning plateau. This allows for analysis of acquisition without including all of the early familiarization error that would have been present in the first three trial blocks of the first session. The eleventh trial block was by design a later learning acquisition block which was similar to a retention test. No feedback was provided during trial block 11 (Day 3). Mean acquisition scores were calculated for each trial block separately for each group. The fourth trial block was compared to the eleventh trial block in a 5 x 2 (Group x Trial Block) ANOVA with repeated measures on the second factor.

Free-Choice Measure

Free-choice time was used to determine the degree of presence of intrinsic motivation. This technique required the covert videotaping of the participant during a 5-min period in the middle of the experimental session. During this period all non-dominant hand basketball activity (i.e., dribbling and shooting) was timed. Additionally, all activity used to mirror the non-dominant hand activity was timed. At the end of the free-choice time, the covert videotape was analyzed and a score was recorded in seconds by summing the activity related to the non-dominant hand basketball activity and behaviors impersonating the non-dominant movement task of interest. These data were analyzed using contrast tests with the no-feedback group as the basis of all comparisons.

Self-Initiated Feedback

The frequency of feedback requested was recorded after each trial, and for analysis it was averaged by trial block, session, and group. This information was used as a behavioral measure of whether the participants' need for competence and self-determination was significantly different between the self-initiated informational feedback and self-initiated controlling feedback groups. The amount of feedback requested by the self-initiated feedback groups was assessed by summing the total number of times that feedback is requested during each trial block. A 2 x 10 (Groups x Trial Block) ANOVA with repeated measures on the last factor was used to evaluate the number of times feedback was requested by the self-initiated informational feedback group and self-initiated controlling feedback group.

Intrinsic Motivation Inventory

The IMI was administered to assess intrinsic motivation toward the non-dominant hand basketball task. The four subscales assessing intrinsic motivation include: (a) interest-enjoyment, (b) competence, (c) effort-importance, and (d) tension-pressure. In addition, questions were modified to refer exclusively to the non-dominant hand basketball activity of interest (see Appendix E). Each of the four subscales was represented by four items with a 7-point Likert scale used to evaluate each question. Each dimension was scored by summing the responses of the corresponding items: (a) interest-enjoyment (1, 7, 8, & 15), (b) competence (2, 12, 14, & 16), (c) effort-importance (3, 4, 6, & 11), and (d) tension-pressure (5, 9, 10, & 13). Each subscale of the IMI has a scoring range of 4 to 28 points and overall composite score between 16 to 112. The IMI composite and subscales scores

were analyzed separately using contrast tests with the no-feedback group as the basis of all comparisons.

Supportive evidence of the reliability of the IMI was published by McAuley et al., (1989). They reported alpha coefficients for each of the subscales; (a) interest-enjoyment = .78, (b) competence = .87, (c) effort-importance = .84, and (d) tension-pressure = .68. Additionally, the overall internal consistency of the complete inventory has been reported to be .85.

Activity-Feeling States

The Activity-Feeling States scale (AFS; Reeve & Sickenius, 1994) was developed as a measure of the underlying psychological needs (i.e., self-determination, & competence) that are the basis of intrinsic motivation. The AFS (Reeve & Sickenius, 1994) was administered to evaluate the participant's competence and self-determination. The AFS scales assesses competence, self-determination, tension, and relatedness (see Appendix F). Subscales for competence, tension, and relatedness were represented by three items with a 7-point Likert scale. Self-determination was represented by four items also with a 7-point Likert scale. Mean values for the self-determination and competence subscales were calculated and used for analyses. A priori hypotheses were examined with contrasts tests comparing the no-feedback group with the experimental groups.

Evidence for the reliability of the AFS was reported by Reeve and Sickenius (1994). They reported alpha coefficients for the subscales; (a) self-determination = .61 and (b) competence = .90.

Competitive State Anxiety Inventory-2

Anxiety was assessed prior to each testing session with the short form of the CSAI-2 (Martens et al., 1990). Additionally, a modified form of the questionnaire was used to evaluate the directional dimension of cognitive anxiety (Jones & Swain, 1992). The modified version assesses the debilitating/facilitative direction of individuals interpretation of anxiety incorporating a 7-point likert scale. The CSAI-2 is composed of three subscales; (a) cognitive anxiety (items, 1, 4, 7, 10, 13, 16, 19, 22, & 25), (b) somatic anxiety (items, 2, 5, 8, 11, 14, 17, 20, 23, & 26), and (c) self-confidence (items, 3, 6, 9, 12, 15, 18, 21, 24, & 27) (see appendix G). The CSAI-2 has been extensively used and found to be a reliable and valid measure of cognitive anxiety, somatic anxiety, and self-confidence (Martens et al., 1990). The questionnaire has also been shown to have good internal consistency; Martens et al. (1990) reported Cronbach alpha coefficients ranging from .79 to .90. For the purpose of this research only the facilitative/debilitative effects of cognitive and somatic anxiety subscales were analyzed with contrast tests using the no-feedback group as basis of all comparisons.

Mediating Effects of Facilitative/Debilitative Anxiety

To examine the mediating effects of anxiety on intrinsic motivation a series of regression analysis were conducted as recommended by Baron and Kenny (1986).

CHAPTER 4

RESULTS

Mean scores were calculated for performance and technique accuracy over the three days of testing. These values were analyzed in separate mixed design ANOVAs. Relatively permanent changes in performance and technique accuracy of the non-dominant hand hook shot were evaluated as a comparison between trial block 4 and trial block 11. An additional mixed design ANOVA was run to examine the amount of feedback requested across the trial blocks by the two self-initiated feedback groups. Tukey's post hoc analysis determined differences in main effects, and simple effect tests were performed when appropriate.

A priori hypotheses concerning the IMI, AFS, CSAI-2, and the free-choice measure were evaluated using multiple contrast tests. Contrast matrices were created using the no-feedback control group as the basis of all contrasts. Levene's test of the homogeneity of variance was used to adjust the degrees of freedom of the contrasts when appropriate. All statistical analyses were performed with alpha set at .05.

The findings are arranged in terms of each of the hypotheses. Initially, results concerning intrinsic motivation, performance, technique, and acquisition are reported. Next, findings of the self-initiated feedback, and the directional interpretation of anxiety are presented. Finally, results concerning the self-report self-determination and competence data are reported. For pilot results see Appendix I.

Hypothesis 1

Hypothesis 1 predicted that the self-initiated informational feedback group should exhibit higher intrinsic motivation than the no-feedback control group as measured by free-choice time, and composite and subscales scores on the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989). It was also expected that the self-initiated controlling feedback group, and the externally initiated informational feedback group, would be detrimentally influenced by the feedback set in comparison to the no-feedback control group. Further, the externally initiated controlling feedback group should exhibit the largest reduction in intrinsic motivation.

Free-Choice Measure

The free-choice measure was the amount of time that participants participated on the non-dominant hand activity during a 5 min period when the experimenter was off the basketball court. Free-choice time was collected after the second trial block of each session. The accumulated time on the activity was evaluated as a behavioral measure of the participant's intrinsic motivation. The amount of time participants were executing the non-dominant hand hook shot was evaluated by contrast tests. The only significant difference identified in the free-choice data was revealed during the third session (Day 3). Figure 4.1 shows the amount of time each group accumulated during the 5 min interval. The self-initiated controlling feedback group (SC) ($t(20) = 2.33, p < .05$) and externally initiated controlling feedback group (EC) ($t(19) = 4.19, p < .001$) groups had significantly lower free-choice times than the no-feedback control group (C). The self-initiated informational feedback group (SI) ($t(50) = -5.49, p < .001$) group had significantly higher

free-choice times than the no-feedback control group. The self-initiated controlling feedback group ($M = 19$ s) and externally initiated controlling feedback group ($M = 10$ s) spent less time on the non-dominant hand behavior, the externally initiated informational feedback group ($M = 34$ s) spent a similar amount of time when compared to the no-feedback control group ($M = 33$ s), while the self-initiated informational feedback group participated in the non-dominant hand activity significantly longer ($M = 102$ s).

Overall, findings concerning the free-choice results were supportive of the hypothesis. The self-initiated informational feedback group spent significantly more free-choice time on the non-dominant hand hook shot in comparison to the no-feedback control group. Also, the self-initiated controlling feedback group and externally initiated controlling feedback group exhibited decrements in free-choice time in comparison with the no-feedback control group. However, the externally initiated informational feedback group was not significantly different than the no-feedback control group.

Intrinsic Motivation Inventory

Composite score. Contrasts examining the composite score of the IMI revealed significant differences during the second and third sessions (See Table 4.1). During the second session, in comparison to the no-feedback control group (C) the self-initiated informational feedback group (SI) ($t(50) = -2.87, p < .01$) and the externally initiated controlling feedback group's (EC) ($t(50) = -2.40, p < .02$) composite scores of intrinsic motivation were significantly higher. These findings were extended during the third session as three of the experimental groups scored significantly higher than the no-feedback control group; the self-initiated informational feedback group, $t(50) = -3.92, p < .01$, the

externally initiated controlling feedback group, $t(50) = -3.05$, $p < .01$, and the externally initiated informational feedback group, $t(50) = -2.83$, $p < .01$.

Interest-enjoyment. Contrasts examining the interest-enjoyment subscale revealed significant differences during the second day of testing. When contrasting the no-feedback control group (C) with the self-initiated informational feedback (SI), $t(50) = -2.85$, $p < .01$, and the externally initiated controlling feedback (EC) groups, $t(50) = -2.40$, $p < .02$, the analysis revealed that both the self-initiated informational feedback ($M = 19.91$, $SD = 3.24$) and the externally initiated controlling feedback ($M = 19.18$, $SD = 3.62$) groups exhibited higher interest-enjoyment scores than the no-feedback control group ($M = 15.36$, $SD = 3.93$).

Competence. A priori hypotheses about competence were analyzed with contrast tests. These tests indicated significant differences during all three sessions (See Table 4.6). During the first session, the externally initiated informational feedback group scored significantly ($t(50) = 2.59$, $p < .05$) lower than the no-feedback control group. In the second session, a comparison of the self-initiated informational feedback group with the no-feedback control revealed the no-feedback control group scored significantly lower ($t(50) = -3.18$, $p < .01$). Analysis of the third session, revealed significant differences between both the self-initiated informational feedback group ($t(50) = -3.11$, $p < .01$) and self-initiated controlling feedback group ($t(50) = -2.22$, $p < .05$) when contrasted to the no-feedback control group. Examination of the means (Table 4.2) during the third session indicated that both the self-initiated informational feedback and self-initiated controlling feedback groups exhibited significantly higher competence scores.

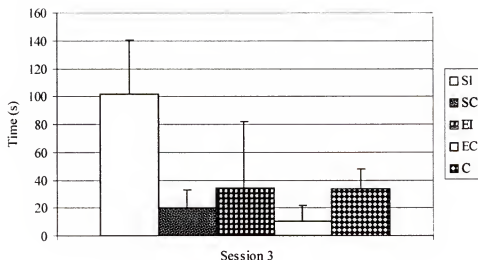


Figure 4.1. Free-choice measure means and standard deviations.

Effort. Planned comparisons investigating differences in effort revealed significant differences only during the third session (See Table 4.3). Three groups scored significantly higher than the no-feedback control group; the self-initiated informational feedback group, $t(50) = -2.59, p < .05$, the externally initiated informational feedback group, $t(50) = -2.22, p < .05$, and the externally initiated controlling feedback group, $t(50) = -2.01, p < .05$.

Tension. Analysis of the tension subscale revealed significant contrasts in each of the three sessions (See Table 4.4). During the first session, both the externally initiated controlling feedback, $t(50) = -3.39, p < .001$, and externally initiated informational feedback, $t(50) = -3.39, p < .001$, groups scored significantly higher on tension than the no-feedback control. The second session again revealed differences with the externally

initiated (controlling & informational feedback) feedback groups scoring significantly higher ($t(50) = -2.29, p < .05$; $t(50) = -3.46, p < .001$) than the no-feedback control group. During the third session, the same differences as the second session were again identified ($t(50) = -3.11, p < .01$; $t(50) = -4.75, p < .001$).

These results were partially supportive of the hypothesis. As the composite scores revealed that during the final two sessions both the self-initiated informational feedback group and the externally initiated controlling feedback group scored significantly higher on the composite score of the IMI than the no-feedback control group. Also, during session 3 the externally initiated informational feedback group's composite score was significantly higher than the no-feedback control group.

Interest-enjoyment subscale results provide some support for the hypothesis. During last two sessions the self-initiated informational feedback group scored significantly higher than the no-feedback control group. However, during the same final two sessions the externally initiated controlling feedback group scored significantly higher on the interest-enjoyment subscale than the no-feedback control group. Additionally, during the third session the externally initiated informational feedback group also scored significantly higher than the no-feedback control group.

The competence subscale results also provide partial support as the self-initiated informational feedback group scored significantly higher than the no-feedback control group during the second and third sessions. The self-initiated controlling feedback group also outscored the no-feedback control group during the final session. The significant

differences between the externally initiated informational feedback and the no-feedback control group during the first session was unexpected.

Results from the effort subscale identified the predicted difference during the third session between the self-initiated informational feedback group and the no-feedback control group. However, in opposition to the hypothesis, both of the externally initiated feedback groups scored significantly higher on the effort subscale in comparison to the no-feedback control group during the third session.

In opposition to the hypothesis all of the experimental groups scored higher on the tension subscale of the IMI. Both of the externally initiated feedback groups scoring significantly higher than the no-feedback control group.

Table 4.1

Mean Composite Score of the IMI

	<u>Session</u>					
	<u>1</u>		<u>2</u>		<u>3</u>	
<u>Group</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
SI	63.09	(11.17)	67.18*	(9.13)	69.55*	(9.87)
SC	61.09	(10.63)	61.27	(8.72)	61.55	(9.70)
EI	61.62	(6.36)	62.55	(10.03)	65.09*	(8.83)
EC	64.64	(6.38)	65.27*	(6.50)	66.00*	(4.02)
C	61.18	(17.90)	55.36	(12.86)	53.55	(13.10)

Note. * indicates significant difference from the no-feedback control group (C).

Table 4.2

Mean Scores on the Competence Subscale of the IMI

Group	<u>Session</u>					
	1		2		3	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
SI	12.27	(5.66)	16.45*	(4.03)	16.91*	(4.04)
SC	14.09	(5.75)	14.00	(5.60)	15.09*	(6.06)
EI	7.73*	(2.87)	9.09	(4.16)	10.27	(4.80)
EC	10.18	(2.93)	10.64	(3.61)	11.45	(4.11)
C	13.09	(6.01)	10.64	(3.72)	10.55	(4.76)

Note. * indicates significant difference from the no-feedback control group (C).

Table 4.3

Mean Scores on the Effort Subscale of the IMI

Group	<u>Session</u>					
	1		2		3	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
SI	17.91	(4.91)	19.73	(4.34)	21.00*	(4.22)
SC	17.36	(2.69)	17.73	(4.15)	17.64	(3.80)
EI	20.09	(4.55)	19.55	(3.62)	20.36*	(4.39)
EC	18.55	(2.81)	19.73	(3.10)	20.00*	(2.61)
C	19.73	(6.48)	18.27	(5.29)	16.55	(4.78)

Note. * indicates significant difference from the no-feedback control group (C).

Table 4.4

Mean Scores on the Tension Subscale of the IMI

<u>Group</u>	<u>Session</u>					
	<u>1</u>		<u>2</u>		<u>3</u>	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
SI	13.73	(4.86)	11.09	(4.01)	12.00	(4.10)
SC	12.55	(5.13)	13.00	(5.33)	11.55	(5.03)
EI	17.73*	(4.08)	17.55*	(3.96)	17.36*	(4.06)
EC	17.73*	(3.04)	15.36*	(3.29)	14.64*	(2.69)
C	11.18	(5.17)	11.09	(4.99)	9.45	(3.24)

Note. * indicates significant difference from the no-feedback control group (C).

Hypothesis 2

The self-initiated informational feedback group should exhibit higher performance and technique scores than the other experimental groups and the no-feedback control group across the ten trial blocks. As well as exhibiting higher acquisition scores during the acquisition blocks on the technique and performance measures than the other experimental groups and the no-feedback control group.

Performance

Performance accuracy scores for the non-dominant hand hook shot were calculated by analyzing each trial for accuracy on a 0 (for missing the basket) to 5 (for making a basket) point scale. Means were analyzed using a 5 (Group) x 10 (Trial Block) ANOVA with repeated measures on the second factor. The analysis indicated a significant

main effect for group, $F(4, 50) = 3.25$, $p < .02$. A significant effect was found for trial block, $F(9, 450) = 11.45$, $p < .001$, and the Group \times Trial block interaction was also significant, $F(36, 450) = 2.21$, $p < .001$. Table 4.5 shows the mean accuracy performance scores for the five groups across the 10 trial blocks.

To further examine the interaction, simple effect tests were conducted across the groups for each trial block (See Figure 4.2). During trial block 1, the self-initiated controlling feedback group scored significantly lower than no-feedback control group, self-initiated informational feedback group, and externally initiated feedback group. Also, the externally initiated controlling feedback group scored significantly lower than the externally initiated informational feedback group, and the no-feedback control group. In the second trial block, the self-initiated informational feedback group scored significantly higher than all of the other experimental groups. In addition, the no-feedback control group scored significantly higher than the self-initiated controlling feedback group. During trial block 5, the externally initiated controlling feedback group scored significantly lower than the self-initiated informational feedback group and the no-feedback control group. These group differences were again identified during trial block 6. The seventh trial block revealed that the self-initiated informational feedback group performed significantly higher than the externally initiated controlling feedback group. Trial block 8 distinguished the self-initiated informational feedback group for scoring significantly higher than the externally initiated controlling feedback group, externally initiated informational feedback group, and self-initiated controlling feedback group. The self-initiated informational feedback group scored significantly higher than all of the experimental groups during trial

block 9. During trial block 10, the self-initiated informational feedback group scored significantly higher than the self-initiated controlling feedback group, externally initiated controlling feedback group, and the no-feedback control group. The externally initiated informational feedback group's performance scores were also significantly higher than the self-initiated controlling feedback group and the externally initiated controlling feedback group.

These performance results were supportive of the hypothesis as the self-initiated informational feedback group significantly outperformed all of the experimental groups and the no-feedback control group except for the externally initiated informational feedback group. Both of the informational feedback groups performance scores were significantly higher than the controlling feedback groups. Additionally, during the second trial block the self-initiated feedback group's performance scores were significantly higher than the experimental groups and the no-feedback control group.

Technique

Technique scores were collected for each trial using a five-point evaluation system (See Appendix H) with a higher score being equated with better technique. A mixed design analysis, Group x Trial Block (5×10) ANOVA indicated a significant trial block effect, $F(9, 450) = 8.09, p < .001$. Also, the interaction of trial block and group was significant, $F(36, 450) = 2.61, p < .001$. The interaction is shown in Figure 4.3. Simple effect tests identified significant differences during trial block 1 (See Table 4.6), the externally initiated informational feedback group's (EI) technique scores were significantly higher than the self-initiated informational feedback group. During trial block 2, the

externally initiated informational feedback group scored significantly higher than the externally initiated controlling feedback group (EC). The externally initiated informational feedback group scored significantly higher than the externally initiated controlling feedback group and the no-feedback control group. Similar results were revealed during the fourth trial block with the externally initiated informational feedback group scoring significantly higher than all of the other experimental groups. During trial block 5, analysis revealed that the externally initiated informational feedback group scored significantly higher on technique score than the externally initiated controlling feedback group. This difference continued through the sixth trial block. During trial block 7, the externally initiated controlling feedback group scored significantly lower than the self-initiated controlling feedback group and the externally initiated informational feedback group. This significant difference was again found during trial block 8. On trial block 9, the self-initiated informational feedback group scored significantly higher than the self-initiated controlling feedback group, externally initiated controlling feedback group, and the no-feedback control group. Additionally, the externally initiated controlling feedback group scored significantly lower than all of the experimental groups. Analysis of trial block 10, indicated that the externally initiated controlling feedback group continued to score significantly lower than the other groups and the self-initiated informational group scored significantly higher than the externally initiated informational feedback group and the externally initiated controlling feedback group.

Technique scores provided partial support for the hypothesis. As the self-initiated informational feedback group's scores were significantly higher than both of the

controlling feedback groups. The externally initiated controlling feedback group's technique scores were significantly lower than all of the other experimental groups and the no-feedback control group.

Skill Acquisition

Additional analyses were conducted to examine the acquisition of the non-dominant hand hook shot. The fourth trial block was compared to the eleventh trial block in a 5 x 2 (Group x Trial Block) ANOVA with repeated measures on the second factor. The analysis revealed two significant effects: (a) group, $F(4, 50) = 5.00, p < .002$, and (b) trial block, $F(1, 50) = 9.65, p < .003$. Significant group differences were revealed, with the self-initiated informational feedback group (SI) scoring significantly higher on performance than the self-initiated controlling feedback (SC), the externally initiated controlling feedback (EC), and the externally initiated informational feedback (EI) groups. These differences are shown in Table 4.7. In addition, the externally initiated controlling feedback group scored significantly lower than the no-feedback control group. Trial block differences were identified with performance scores significantly increasing over the two skill acquisition sessions.

Additionally, a significant effect was found for the Group x Trial Block interaction, $F(4, 50) = 7.83, p < .001$. The interaction is shown in Figure 4.4. Simple effect tests revealed that during the eleventh trial block the self-initiated informational feedback group's performance scores were significantly higher than the self-initiated controlling feedback group, externally initiated informational feedback group, externally initiated controlling feedback group, and the no-feedback control group. Further, the externally

initiated controlling feedback group scored significantly lower than all of the other experimental groups on trial block 11.

Skill (performance) acquisition findings provide strong support for the hypothesis. The self-initiated informational feedback group's skill acquisition scores were significantly higher than the no-feedback control group and the other experimental groups. In addition, the externally initiated controlling feedback group scores were significantly lower than all of the other groups.

Technique Acquisition

Acquisition of the technique accuracy was evaluated for evidence of motor skill learning using a mixed design Group (5) x Trial Block (2) ANOVA. The analysis revealed two significant effects: (a) trial block, $F(1,50) = 14.90$, $p < .001$, and (b) Group x Trial Block, $F(4,50) = 5.36$, $p < .001$. This interaction is displayed in Figure 4.5. Table 4.8 shows the group means and standard deviations. Post hoc analysis indicated that on trial block 4, the externally initiated informational feedback group (EI) scored significantly higher than the other experimental groups. During the eleventh trial block, the self-initiated informational feedback group (SI) exhibited significantly higher technique scores than all groups except for the self-initiated controlling feedback group (SC).

The technique acquisition results offer partial evidence for the hypothesis. The self-initiated informational feedback group's technique acquisition scores were significantly higher than the no-feedback control group and the externally initiated feedback group's. Unexpected results were identified during the trial block 4, as the externally initiated

informational feedback group's technique score was significantly higher than all of the other experimental groups and the no-feedback control group.

Hypotheses 3 & 5

According to the predictions regarding feedback requests the self-initiated informational feedback group should request more feedback than the self-initiated controlling feedback group. Additionally, it was expected that requests for feedback would decrease over the experimental sessions for both of the self-initiated feedback groups.

Self-Initiated Feedback

The amount of feedback requested by both groups in the self-initiated conditions were analyzed using a Group x Trial Block (2 x 10) ANOVA with repeated measures on the last factor. The analysis identified significant main effects for group, $F(1, 20) = 35.20$, $p < .001$, and trial block, $F(9, 180) = 3.62$, $p < .001$. Main effect tests revealed that the self-initiated informational feedback group ($M = 1.63$, $SD = .42$) requested significantly more feedback per trial block than the self-initiated controlling feedback group ($M = .14$, $SD = .13$). Main effects test for trial block identified that significantly more feedback was requested in the early trial blocks than later. The Group x Trial Block interaction only approached significance, $F(9, 180) = 1.74$, $p < .08$.

Hypothesis 4

The self-initiated informational feedback group should exhibit significantly higher facilitative directional scores of anxiety (cognitive & somatic) as measured by the Competitive State Anxiety Inventory - 2 (CSAI-2; Martens, Burton, Vealey, Bump, &

Smith, 1990) than the no-feedback control group. In addition, the self-initiated controlling feedback group, and the externally initiated informational feedback group, would be detrimentally influenced by the feedback set in comparison to the no-feedback control group. Further, the externally initiated controlling feedback group should exhibit the largest reduction in intrinsic motivation.

Facilitative/Debilitative Effect of Cognitive Anxiety

The analysis of the facilitative or debilitating effect of cognitive anxiety identified a significant effect during the second session. The externally initiated controlling feedback group ($M = -.64$, $SD = 2.69$) found cognitive anxiety to be significantly, $t(12) = 2.22$, $p < .05$, more debilitating than the no-feedback control group ($M = 5.18$, $SD = 8.27$).

Results from the facilitative/debilitative effect of cognitive anxiety were partially supportive of the research hypothesis. The only significant difference was that the externally initiated controlling feedback group scored cognitive anxiety significantly more debilitating than the no-feedback control group during the second session.

Facilitative/Debilitative Effect of Somatic Anxiety

Contrast tests investigating the directional effect of somatic anxiety between the experimental groups and the no-feedback control group revealed differences during the final session. The externally initiated controlling feedback group ($M = 1.73$, $SD = 4.24$) rated somatic anxiety to be significantly less facilitative than the no-feedback control group ($M = 7.18$, $SD = 6.63$) ($t(17) = 2.30$, $p < .05$). No other significant differences were found.

As with cognitive anxiety's facilitative/debilitative effects the findings from somatic anxiety were partially supportive of the hypothesis. During the third session the externally initiated controlling feedback group scored somatic anxiety to be significantly less facilitative than the no-feedback control group.

Hypothesis 6

The self-initiated informational feedback group should exhibit higher scores on self-determination and competence subscales of the Activity-Feeling States (AFS; Reeve & Sickenius, 1994) in comparison to the no-feedback control group. The self-initiated controlling feedback group and the externally initiated informational feedback group should be detrimentally influenced in comparison to the no-feedback control group on the self-determination and competence subscales. Further, the externally initiated controlling feedback should be expected to exhibit the largest reduction in scores on the self-determination and competence subscales.

Activity-Feeling States Scale

Competence. Planned contrasts revealed that during the second session the self-initiated informational group (SI) scored significantly higher on competence than the no-feedback control group (C), $t(50) = -2.17, p < .05$. As shown in Table 4.9 the analysis of third session again revealed significant differences during the third session between the same two groups, $t(50) = -2.79, p < .01$.

Partial support of the hypothesis concerning the competence subscale of the identified that during the last two sessions the self-initiated informational feedback group had significantly higher competence scores than the no-feedback control group.

Table 4.5

Mean and Standard Deviation Performance Scores for the Five Treatment Groups Across Trial Blocks 1-10

<u>Group</u>	<u>Trial block</u>									
	1	2	3	4	5	6	7	8	9	10
SI	2.43 ^d (.59)	2.88 ^{a,b,c,d} (.44)	2.80 (.53)	2.78 (.43)	2.80 ^b (.27)	2.85 ^b (.46)	2.97 ^b (.55)	3.13 ^{b,c,d} (.37)	2.92 ^{a,b,c,d} (.64)	2.99 ^{a,b,d} (.31)
SC	1.92 ^{a,c} (.65)	1.82 ^a (.65)	2.46 (.63)	2.54 (.76)	2.45 (.47)	2.52 (.39)	2.73 (.52)	2.72 (.42)	2.36 (.50)	2.36 ^c (.55)
EI	2.53 ^{b,d} (.57)	2.12 (.45)	2.51 (.57)	2.37 (.44)	2.45 (.30)	2.56 (.59)	2.65 (.34)	2.46 (.29)	2.46 (.29)	2.85 ^{b,d} (.33)
EC	2.02 ^c (.42)	2.17 (.64)	2.56 (.65)	2.48 (.42)	2.27 ^a (.53)	2.21 ^a (.81)	2.33 (.55)	2.56 (.55)	2.34 (.53)	2.30 ^c (.60)
C	2.46 (.57)	2.35 (.71)	2.66 (.52)	2.71 (.44)	2.72 ^b (.46)	2.74 (.37)	2.73 (.46)	2.80 (.29)	2.45 (.22)	2.57 (.26)

Note. ^a indicates significant difference from the C group

^b indicates significant difference from the EC group

^c indicates significant difference from the EI group

^d indicates significant difference from the SC group

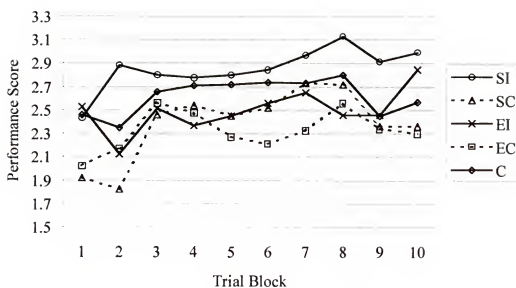


Figure 4.2. Group performance means as a function of trial block.

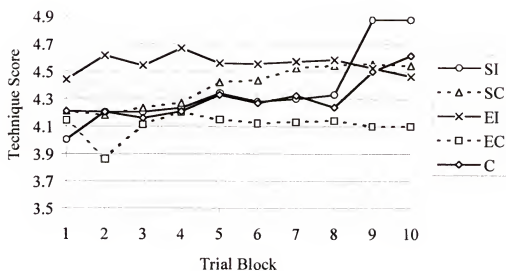


Figure 4.3. Group technique means as a function of trial block.

Table 4.6

Technique Scores for Each Treatment Group Across Trial Blocks 1-10

<u>Group</u>	<u>Trial Block</u>									
	1	2	3	4	5	6	7	8	9	10
SI	4.00 ^c	4.20	4.20	4.23 ^c	4.34	4.28	4.30	4.33	4.87 ^{a,b,c}	4.87 ^{b,c}
	(.37)	(.39)	(.41)	(.47)	(.39)	(.48)	(.48)	(.51)	(.30)	(.30)
SC	4.21	4.18	4.23	4.27 ⁱ	4.42	4.43	4.52 ^b	4.54 ^b	4.55 ^b	4.54 ^b
	(.43)	(.45)	(.37)	(.33)	(.29)	(.38)	(.40)	(.36)	(.41)	(.37)
EI	4.44	4.61 ^b	4.54 ^b	4.67 ^{a,b,d}	4.56 ^b	4.55 ^b	4.57 ^b	4.58 ^b	4.52 ^b	4.46 ^b
	(.41)	(.39)	(.41)	(.32)	(.32)	(.39)	(.33)	(.34)	(.26)	(.31)
EC	4.14	3.86 ^c	4.11 ^c	4.20	4.15 ^c	4.12 ^c	4.13 ^{c,d}	4.14 ^{c,d}	4.10 ^{a,c,d}	4.10 ^{a,c,d}
	(.51)	(.94)	(.47)	(.47)	(.49)	(.50)	(.49)	(.53)	(.51)	(.53)
C	4.21	4.20	4.16 ^c	4.21 ^b	4.33	4.27	4.32	4.24	4.50 ^b	4.61 ^b
	(.38)	(.39)	(.37)	(.40)	(.52)	(.42)	(.42)	(.46)	(.47)	(.38)

Note. ^a indicates significant difference from the C group

^b indicates significant difference from the EC group

^c indicates significant difference from the EI group

^d indicates significant difference from the SC group

Table 4.7

Skill Acquisition Scores

<u>Group</u>	<u>Trial Block 4</u>		<u>Trial Block 11</u>	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
SI	2.78	.43	3.38 ^{a,b,c,d}	.32
SC	2.54	.76	2.58 ^b	.45
EI	2.37	.44	2.92 ^b	.39
EC	2.48	.42	2.15 ^{a,c,d}	.58
C	2.71	.44	2.80 ^b	.36

Note. ^aindicates significant difference from the C group

^bindicates significant difference from the EC group

^cindicates significant difference from the EI group

^d indicates significant difference from the SC group

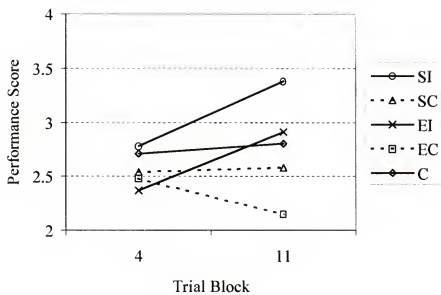


Figure 4.4. Skill acquisition Group x Trial Block Interaction.

Table 4.8

Technique Acquisition Scores

<u>Group</u>	<u>Trial Block 4</u>		<u>Trial Block 11</u>	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
SI	4.23 ^c	.47	4.88 ^{a,b,c}	.30
SC	4.27 ^c	.33	4.60 ^b	.33
EI	4.67 ^{a,b,d}	.32	4.46	.32
EC	4.20 ^c	.47	4.27 ^d	.50
C	4.21 ^c	.40	4.56	.38

Note. ^aindicates significant difference from the C group

^bindicates significant difference from the EC group

^cindicates significant difference from the EI group

^dindicates significant difference from the SC group

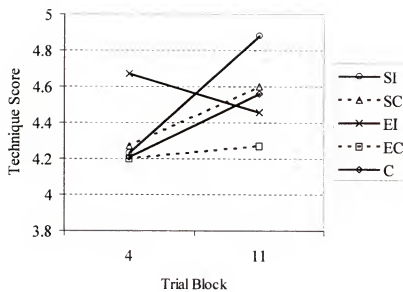


Figure 4.5. Technique acquisition Group x Trial Block Interaction.

Table 4.9

Mean Scores on the Competence Subscale of the AFS

<u>Group</u>	<u>Session</u>					
	<u>1</u>		<u>2</u>		<u>3</u>	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
SI	3.64	(1.51)	4.67*	(1.10)	4.58*	(.96)
SC	3.55	(1.45)	4.03	(1.80)	3.97	(1.62)
EI	3.50	(1.57)	3.15	(1.24)	3.67	(1.08)
EC	3.28	(1.23)	3.22	(1.25)	2.96	(1.06)
C	3.87	(1.84)	3.44	(1.16)	3.11	(1.36)

Note. * indicates significant difference from the no-feedback control group (C).

CHAPTER 5

DISCUSSION, SUMMARY, CONCLUSIONS, AND SUGGESTIONS FOR FUTURE RESEARCH

The purpose of this research was to test cognitive evaluation theory's assumption concerning informational and controlling feedback. It has been proposed that when individuals are afforded informational feedback perceptions of self-determination and competence will be enhanced as well as the individuals' intrinsic motivation (Deci & Ryan, 1980, 1985, 1991). However, when feedback is afforded in a controlling format participants have a deficit in perceptions of self-determination and competence and in turn a reduction in intrinsic motivation. As a means of examining the influence of self-determination participants were afforded with the ability to request feedback versus feedback being externally initiated. Additionally, this research examined the possible mediating effects of anxiety on the differentiation of feedback.

To test these theoretically driven factors, participants were introduced to a novel motor task and their performance, technique, acquisition, intrinsic motivation, competence, self-determination, and anxiety were evaluated. Results of the performance and technique data were consistent with cognitive evaluation theory, and the hypotheses of this research. Acquisition results from both the skill and technique data were congruent with the predicted hypotheses and its theoretical basis. Also, free-choice measure results were consistent with the theoretical basis of cognitive evaluation theory. Further, the amount of

feedback requested by each of the self-initiated groups was compatible with the theoretical basis of this research. The self-initiated informational feedback group requested significantly more feedback than the self-initiated controlling feedback group.

Results from the IMI questionnaire were not as clear. Hypothesized findings were observed from the composite score and the competence subscale. However, findings from the interest-enjoyment and effort subscales were not as supportive. Data from the Activity-Feeling States scale examining the subscale of competence were also supportive of the current hypotheses as well as the basic tenets of cognitive evaluation theory. However, the subscale examining self-determination failed to identify any group differences.

The analyses of the anxiety data did not reveal any mediating effects concerning the differentiation of feedback, but, differences in the facilitative/debilitative effects of cognitive and somatic anxiety were found. These findings are indicative of the importance of further research to clarify the relationship between intra personal interpretation of anxiety and the differentiation of feedback.

The remainder of this chapter is organized to discuss the current findings in light of the hypotheses and the theoretical background of this research. Considerations for future research are discussed at the conclusion.

Performance and Technique

Performance

The performance hypothesis generated for this research suggested that the self-initiated informational feedback group would perform significantly better than the other experimental groups. This hypothesis was supported. The self-informational feedback

group performed significantly better than both of the controlling feedback groups (self-initiated and externally initiated). Further, both of the informational feedback groups excelled in comparison to the no-feedback control groups, the controlling feedback groups were both inferior (less performance refers to fewer made hook shots) when compared to the no-feedback control group. These findings support conclusions from previous studies in that self-regulated learning strategies enhanced performance (Hardy & Nelson, 1988; Janelle et al. 1997). Indeed, researchers have consistently found that informational feedback improves performance (Deci & Ryan, 1980, 1985, 1991; Vallerand & Ried, 1984).

Technique

The current hypothesis regarding technique proposed that the self-initiated informational feedback group would score significantly higher on the technique measure than the other experimental groups. The hypothesis was supported in that the technique scores for the self-initiated informational group were significantly higher than the both of the externally initiated feedback groups (informational and controlling). Further, the externally initiated controlling feedback group's technique scores were significantly lower than the all of the other groups. Closer inspection of the technique trial block data revealed that the self-initiated informational feedback group, the self-initiated controlling feedback group and the no-feedback control group improved their technique scores an average of .53 over the 10 trial blocks. However, the externally initiated informational feedback group and the externally initiated controlling feedback group technique scores remained relatively unchanged across the trial blocks.

Theoretical expectations presumed that by offering participants the opportunity to control their own feedback schedule technique scores would be improved in comparison to participants without this opportunity (Janelle et al., 1997; Janelle et al., 1995). This hypothesis was supported by the technique improvements observed in the self-initiated feedback groups as well as the lack of improvement in the externally initiated feedback groups. Perhaps this lack of improvement is caused by learned helplessness. That is, the participants may realize that the initiation of the feedback necessary to facilitate improvement is not under their control so that the outcome becomes non-contingent on their behavior instigating a state of learned helplessness. Seligman (1975) offers a theoretical explanation for these findings. He proposed that when individuals feel that the reinforcement of a behavior is not positively related to their effort then the individuals will withdraw their effort. Therefore, as he proposed, participants in this research that were not afforded the opportunity to exert control over the initiation of feedback (externally initiated feedback groups) may have reacted in a learned helplessness manner negatively influencing their technique.

Acquisition

Skill Acquisition

Theoretically driven hypotheses concerning skill acquisition proposed that the self-initiated informational feedback groups would exhibit significantly higher skill acquisition scores than the other experimental groups. The skill acquisition findings provide theoretical support for the differentiation of feedback. Indeed, the self-initiated informational feedback group scored significantly higher during the acquisition phase than all of the other

experimental groups. Additionally, all of the experimental groups scored higher on the skill acquisition measure than the externally initiated controlling feedback group. The informational feedback group's skills (self-initiated; 2.78 - 3.38, externally initiated; 2.37 - 2.92) improved over time, whereas the self-initiated controlling feedback group's skill (2.54 - 2.58) remained about the same, and the externally initiated controlling feedback group's skill (2.48 - 2.15) decreased slightly. These findings provide further support for Deci and Ryan's (1980, 1985, 1991) proposition that self-initiated informational feedback enhances levels of self-determination and competence positively influencing skill acquisition. In this research the participants that were given informational feedback within a self-initiated format outperformed all of the other groups. In contrast, controlling feedback has the opposite effect diminishing perceptions of self-determination and competence thereby detrimentally affecting skill acquisition. This position was also supported when the externally initiated controlling feedback group was out scored on skill acquisition by all of the other groups. Therefore, as theorized by Deci and Ryan (1980, 1985, 1991), informational feedback enhanced skill acquisition, and controlling feedback detrimentally affected skill acquisition.

Technique Acquisition

This research tested a theoretically driven hypothesis concerning technique acquisition that the self-initiated informational feedback group would score significantly higher than the other experimental groups. The retention trial block (11) data provide support for the hypothesis. The self-initiated informational feedback group scored significantly higher on technique acquisition than the both of the externally initiated

feedback groups and the no-feedback control group. Further support comes from the directional trends revealed in the data. It is important to note that during trial block 4 the externally initiated informational feedback group's technique score was higher than all of the other experimental groups. However, during the 11th trial block the externally initiated informational feedback group's scores were detrimentally influenced by the feedback reducing scores from 4.67 to 4.46. On the other hand, the self-initiated informational feedback group's technique acquisition scores improved from 4.23 to 4.88 the self-initiated controlling feedback group's scores also improved but not to the same extent (4.27 - 4.60), and the no-feedback control group exhibited a similar level of improvement (4.21 - 4.56). These findings support the hypothesis relating to the expected decrement in acquisition caused by the controlling feedback (Deci & Ryan, 1980, 1985, 1991). As hypothesized the self-initiated informational feedback group outperformed the other experimental groups and the controlling feedback groups technique acquisition was not enhanced by the controlling feedback. In addition, support of self regulation of feedback was also found (Janelle et al., 1997; Janelle et al., 1995). Both self-initiated feedback groups scored higher on technique acquisition than the externally initiated feedback groups. These findings are interpreted as a strong indication that the optimal environment for technique acquisition would incorporate the use of informational feedback within a self-regulated format.

Free-Choice Measure

The hypothesis tested concerning the free-choice measure of intrinsic motivation was that the self-initiated informational feedback group would spend a significantly longer amount of time participating in the non-dominant hand behavior than the no-feedback

control group. Further, the controlling feedback groups and the externally initiated informational feedback group would be detrimentally influenced by the differentiated feedback. Indeed, these free-choice results support the differentiation in feedback as theorized by Deci and Ryan (1980, 1985, 1991). They found that when individuals received informational feedback concerning their behavior that they would spend more time on that behavior during free-choice periods than individuals receiving controlling feedback. The present results indicated, as expected, that the self-initiated informational feedback group spent 102 s on the non-dominant hand behavior during the third session, the no-feedback control group spent only 33 s, the externally initiated informational feedback group spent 34 s, the self-initiated controlling feedback group spent 19 s, and the externally initiated controlling feedback group spent 10 s. Using the no-feedback group as a baseline these results revealed that the self-initiated informational feedback group's intrinsic motivation was positively affected by their feedback set. However, the controlling feedback groups (self-initiated & externally initiated) were detrimentally affected and the externally initiated informational feedback group was relatively unchanged by the feedback set. These findings are consistent with previous research that reports that informational feedback causes an increase in a individual's self-determination and competence. However, controlling feedback causes a reduction in self-determination and competence. Further, findings from the externally initiated informational feedback group suggest that the informational feedback possibly ameliorates the detrimental cost of the loss of self-determination caused by the external control of the feedback leaving intrinsic motivation unchanged compared to the no-feedback control group.

Self-Initiated Feedback

The amount of feedback requested by the informational feedback group was predicted to be significantly more than the controlling feedback group. The results support this hypothesis reporting that the self-initiated informational feedback group requested significantly more feedback than the self-initiated controlling feedback group. Cognitive evaluation theory proposes that informational feedback promotes self-determination and competence. While controlling feedback seems to discourage self-determination and competence. The present findings revealed that the controlling feedback detrimentally affected perceptions of self-determination and competence as well as reduced the frequency that individuals requested feedback.

Glaser's (1996) position regarding the decline in feedback requested as a result of the progression along the stages of expertise acquisition was also examined. These findings supported the theoretical position concerning the reduction in an individual's need for external support as they progress through the stages of expertise acquisition. In accordance with Glaser's (1996) stages of expertise acquisition the results indicated that the amount of feedback requested declined over the 10 trial blocks in support of his assumption. Yet, performance and technique scores over the same 10 trial blocks increased. Suggesting that the participants of this research progressed through the first stage (external support) and have at least reached the transition stage. Perhaps, a few participants even reached the level of self-regulation.

Intrinsic Motivation

Composite Score

As with the behavioral measure of intrinsic motivation the theoretically driven hypothesis regarding the subjective attitudinal measure of intrinsic motivation stated that the self-initiated informational feedback group would score significantly higher on the composite score of the IMI in comparison to the no-feedback control group. Also it was expected that the other experimental groups would be detrimentally influenced in comparison with the no-feedback control group. With the externally initiated controlling feedback group being most influenced in a manner harmful to the participant's intrinsic motivation. The hypotheses were partially supported as the self-initiated informational feedback group scored significantly higher than the no-feedback control group during the last two sessions on the overall composite score of the IMI. However, in contradiction to predictions, the externally initiated controlling feedback was not the most detrimentally influenced by the feedback sets. Instead, they also exhibited significantly higher scores on the composite score of intrinsic motivation over the last two session in comparison to the no-feedback control group.

A more in depth examination of the means reveals that this unexpected difference could be the result of initial differences in the composite score. The externally initiated controlling feedback group's composite score was the highest first session score of all of the groups (SI = 63.09; SC = 61.09; EI = 61.62; EC = 64.64; C = 61.18). Indeed, as the self-initiated informational feedback group's score raised over six points (63.09 to 69.55) the externally initiated controlling feedback group's score improved less than two points

(64.64 to 66.00). Additionally, the both controlling feedback groups showed little growth in composite score over the three sessions (SC; 61.09 to 61.55, EC; 64.64 to 66.00). While both informational feedback groups showed more intrinsic motivation growth (SI; 63.09 to 69.55, EI; 61.62 to 65.09) as compared to the no-feedback control group's score decreased over the three sessions from 61.18 to 53.55. Therefore, as expected the self-initiated informational feedback groups scores were significantly better than the no-feedback control group. But, the other experimental groups were not detrimentally influenced by feedback set in comparison to the feedback control group as predicted.

Interest-Enjoyment

The hypothesis regarding the interest-enjoyment subscale of the IMI was similar in its prediction that the self-initiated informational feedback group would score significantly higher on the subscale of interest-enjoyment in comparison to the no-feedback control group. It was also expected that self-initiated controlling feedback group, and the externally initiated feedback group, would be detrimentally influenced by the feedback set in comparison to the no-feedback control group. Further, it was also predicted that the externally initiated controlling feedback group would exhibit the largest decrease on the interest-enjoyment subscale of the IMI. The results failed to support this hypothesis. The only significant difference identified occurred during the second session. On Day 2, both of the self-initiated informational feedback group and the externally initiated controlling feedback group scored significantly higher on the interest-enjoyment subscale. While these results were not expected, previous research (Luyten & Lens, 1981; Ryan, 1982) failed to identify significant differences on subjective ratings of intrinsic motivation. Wiersma (1992)

noted conflicting findings when free-choice measures were used. Identifying detriments in intrinsic motivation when measuring intrinsic motivation with free-choice measures.

However, subjective attitudinal measures have not always been congruent with behavioral measures. Consequently, Wiersma (1992) has questioned the operationalization of intrinsic motivation.

Competence

This study examined the hypothesis that the self-initiated informational feedback group would score significantly higher on the IMI subscale of competence in comparison to the no-feedback control group. Further, the controlling feedback groups and the externally initiated informational feedback group would be detrimentally influenced by the differentiated feedback with the largest decrease in competence being exhibited in the externally initiated controlling feedback group. Cognitive evaluation theory proposed that informational feedback would increase competence. Also, the performance increases associated with self-regulated feedback were expected to positively affect perceptions of competence. The current findings provide partial support for the hypothesis. Indeed, trends revealed the self-initiated informational feedback group competence scores increased from 12.27 to 16.91 and the no-feedback control group scores decreased slightly from 13.09 to 10.55.

However, the decreased competence exhibited by the no-feedback control group was not mimicked by the self-initiated controlling feedback group (14.09 - 15.09), the externally initiated informational feedback group (7.73 - 10.27), or the externally initiated controlling feedback group (10.8 - 11.45). Scores for the self-initiated controlling feedback

group and the externally initiated feedback group's increased slightly over the three sessions. Perhaps, denying the no-feedback control group any technique feedback reduced their perceptions of control over their performance in turn, leading to increased perceptions of helplessness as evident in their reduction in competence.

Effort

The self-initiated informational feedback group was expected to score significantly higher than the no-feedback control group. In addition, the self-initiated controlling feedback group and the other externally initiated feedback groups would be detrimentally affected in comparison to the no-feedback control group with the most detriment being exhibited by the externally initiated controlling feedback group. The present results partially supported the hypothesis. The effort score trends indicate that the self-initiated informational feedback group increased from 17.91 to 21.00. On the other hand, the no-feedback control feedback group's effort scores were reduced over time from 19.73 to 16.55. Further, the self-initiated controlling feedback group (17.36 - 17.64), the externally initiated informational feedback group (20.09 - 20.36), and the externally initiated controlling feedback group (18.55 - 20.00) remained relatively unchanged. These results parallel the competence scores and are supportive of the no-feedback control group's loss of control over their environment causing them to fall into an apparent state of learned helplessness. Therefore, providing support for the importance of an individual's need for contingency between their behavior and outcome experiences (Peterson, Maier, Seligman, 1993).

Self-Determination and Competence

Self-Determination

The self-determination subscale of the AFS failed to reveal any significant contrast in comparison of the experimental groups to the no-feedback control group. This is in part due to the relatively low alpha coefficient (.61) for the self-determination subscale. It also could be caused by the participants' inability to define the degree of autonomy they had in the experimental situation. Within the theoretical framework of this research the inability of the differential feedback sets to be distinguished by a measure of self-determination is unexpected. Cognitive evaluation theory purposes as one of its basic tenets that self-determination is a building block of intrinsic motivation. Yet, in this study feedback set was able to influence intrinsic motivation as measured by both a self-report measure (IMI) and a behavioral measure (free-choice time) without significantly influencing the participants self-determination as measured by the AFS. Based on the position that the self-determination subscale of the AFS served as a manipulation check of this research's functional influence of self-determination, no significant change in self-determination was observed. Therefore, this research cannot provide support for cognitive evaluation theorists position of self-determination being one of the foundations of intrinsic motivation.

Competence

The hypothesis regarding the competence subscale of the AFS expected the self-initiated informational feedback group to score significantly higher than the no-feedback control group. Also, the self-initiated controlling feedback group and the externally initiated informational feedback group should be detrimentally influenced in comparison to

the no-feedback control group. In addition, the externally initiated controlling feedback group should exhibit the largest reduction in competence in comparison to the no-feedback control group. The findings partial support this hypothesis. The self-initiated informational feedback group's competence scores increased from 3.64 to 4.58 as compared to the no-feedback control group which revealed a decrease in competence from 3.87 to 3.11. The self-initiated controlling feedback group (3.55 - 3.97) and the externally initiated informational feedback group (3.50 - 3.67) showed slight increases over the three sessions.

Anxiety

Facilitative/Debitative Effect of Cognitive Anxiety

The facilitative and debilitative effect of cognitive anxiety was predicted to be perceived to be significantly more facilitative by the self-initiated informational feedback group than the no-feedback control group. Further, it was expected that the self-initiated controlling feedback group and the externally initiated feedback groups would also score cognitive anxiety significantly less facilitative in comparison to the no-feedback control group. The results indicate partial support for the hypothesis. During the second session the externally initiated controlling feedback group reported that the effects of cognitive anxiety to significantly less facilitative than the no-feedback control group. Indeed, examination of the rating trends reveal that the no-feedback control group (2.36 - 1.55) rating decreased. The externally initiated feedback groups ratings increased while remaining on the debilitative side of the continuum (informational, - 2.00 - - 1.36; controlling, - .82 - -.009). While the informational groups ratings increased and remained on the facilitative side of cognitive anxiety (informational, 5.59 - 6.64; controlling, 4.65 - 6.09). Note that the

self-initiated informational groups perceived cognitive anxiety in a more facilitative manner and the externally initiated groups perceptions were debilitating in perception.

Facilitative/Debilitative Effect of Somatic Anxiety

As with the effect of cognitive anxiety the theoretically driven hypothesis for the facilitative/debilitative effect of somatic anxiety proposes that the self-initiated informational feedback group would rate the effect of somatic anxiety more facilitative than the no-feedback control group. Also, the self-initiated controlling feedback group and the externally initiated feedback groups would rate the effect of somatic anxiety in a more debilitating manner than the no-feedback control group. The results supported this hypothesis. During the third session, the externally initiated controlling feedback rated the effect of somatic anxiety to be significantly less facilitative than the no-feedback control group.

Examination of the data from the first and third sessions revealed that trends in the means were directly supportive of the hypothesis. All of the groups ratings increased over the three sessions the self-initiated informational feedback increased their rating 2 points, the no-feedback control group 2.73 points, the self-initiated controlling feedback group .36 points, the externally initiated informational feedback group .64 points, and the externally initiated controlling feedback 2.28 points. As predicted, the feedback manipulation influenced participants' perceptions of the effect of anxiety. The third session's results revealed that the self-initiated feedback group rated the effect higher than all of the other groups, followed by the no-feedback control group, the self-initiated controlling feedback

group, the externally initiated informational feedback group, and the externally initiated controlling feedback group.

Mediating Effects of Anxiety

The analysis of the facilitative/debilitative effects of anxiety on the influence of feedback set on intrinsic motivation failed to support the mediation hypothesis. Regression analysis failed to reveal any significant differences when regressing the facilitative/debilitative effects of anxiety or free-choice time on to groups. So, as recommended by Baron and Kenny (1986), when examining whether a mediating effect is influencing the outcome, both variables (anxiety and intrinsic motivation) must be concurrently significant. Since neither were significant, no mediating effect was found. However, when remembering findings failed to reveal any mediating influence of anxiety on motivation. It is important to mention that additional subscales of both the IMI and the AFS scale revealed significant differences in tension levels of the experimental groups. This brings into question the relationship between measure of anxiety and tension.

Tension

This presentation of results must first be properly portrayed as not having been directly represented within any of the original hypotheses of this research. Therefore, the discussion of the findings are purely descriptive because of the inclusion in the self-report scales used for this research.

The findings from the tension subscale of the IMI revealed that during all three sessions both of the externally initiated feedback groups scored significantly higher than the no-feedback control group. This significant trend was again uncovered when examining the

tension subscale of the AFS. During all three sessions the externally initiated informational and externally initiated controlling feedback group's scored significantly higher on the tension subscale than the no-feedback control group.

These differences in the tension subscales were especially interesting when considering the self-report measures concerning anxiety. Both of the self-report scales regarding tension posit questions regarding the participant's perceptions of being stressed, pressured, tense, and uptight (See Appendixes E & F). To examine the relationship between the cognitive anxiety and somatic anxiety subscales of the CSAI-2 and the tension subscales of the AFS and the IMI correlations were run on the third session data. Results revealed that the cognitive anxiety scale of the CSAI-2 and the tension scales of the IMI and AFS were significantly related (See Table 5.1).

Table 5.1

Correlations Between Anxiety Subscales of the CSAI-2 and Tensions Subscales of the IMI and AFS

Subscale	1	2	3	4
1. Cognitive Anxiety	--	.18	.60**	.56**
2. Somatic Anxiety	--	--	.38**	.30*
3. Tension (IMI)	--	--	--	.85**
4. Tension (AFS)	--	--	--	--

* $p < .05$. ** $p < .01$.

The significant relationships between both of the tension subscales and cognitive anxiety are of interest because of the incongruity of the findings. An ANOVA of the third session cognitive anxiety data did not uncover any significant differences. However, differences were identified on the tension subscales. The relationship between tension and cognitive anxiety while significant is not sufficient to assure congruent findings. Additional discrepancies in the results were found concerning the interest-enjoyment subscale of the IMI and the self-determination subscale of the AFS.

Contrary Self-Report Findings

Cognitive evaluation theory proposed that the interest-enjoyment ratings should be differentially effected based on feedback set. Furthermore, since one of the basic tenets concerns self-determination it would be hypothesized that feedback set would differentiate participants. However, neither of these subjective measures support the assumptions of the theory. Moreover, the interest-enjoyment results based on the scales reliability (.80) are surprising, except when considering previous research, which has also revealed inconsistent results concerning behavioral and self-report measures of intrinsic motivation (Wiersma, 1992).

Ryan, Koestner, and Deci (1991) proposed the use of correlations between free-choice measures and the interest-enjoyment and competence subscales of the IMI in an attempt to assess intrinsic motivation in further detail. They proposed that correlations will be strong and positive when behaviors are intrinsically motivated. Whereas, correlations will be weaker and possibly negative when a behavior is internally controlling. Therefore, in an attempt to clarify the third session data correlations were conducted. However, instead

of clarifying these findings data only more confusion was added. The correlations revealed little relationship between the self-initiated informational feedback group's free-choice times and their interest-enjoyment and competence scores ($r = .09$; $r = -.17$). The self-initiated controlling feedback group also exhibited an unexpected lack of a correlation between free-choice time and interest-enjoyment, $r = .01$, and a more expected negative correlation for competence, $r = -.32$. Also, the externally initiated informational feedback group exhibited incongruent results for the interest-enjoyment, $r = .15$, and competence, $r = -.02$. In addition, the unexpected results were evident for the externally initiated controlling feedback group ($r = -.25$; $r = .23$). The no-feedback control group also displayed enigmatic results by exhibiting relatively no relationship ($r = -.02$; $r = -.10$).

Based on Ryan, Koestner, and Deci (1991) the self-initiated informational feedback group was expected to exhibit stronger positive correlations between free-choice time and the interest-enjoyment and competence subscales of the IMI. Furthermore, the experimental groups detrimentally affected by controlling feedback and/or loss of self-determination through externally initiated feedback were expected to exhibit negative correlations for both subscales. Thereby leaving this research with some unexpected results.

Summary

This research was designed to test Deci and Ryan's (1985) cognitive evaluation theory. Specifically, their position regarding the differentiation between informational and controlling feedback was examined. Informational feedback was predicted to increase intrinsic motivation whereas controlling feedback was predicted to reduce intrinsic

motivation. These predictions were based primarily on feedback effects on two factors; self-determination and competence. Deci and Ryan (1985) suggested that informational feedback increases an individual's perception of self-determination and competence. However, controlling feedback caused a detriment in perceptions of self-determination and competence. These alterations in an individual's perceptions of their own self-determination and competence are proposed to affect intrinsic motivation. As a means to test this theory a new approach was introduced. In an attempt to afford participants the opportunity to exert control over their own environment a motor learning paradigm was used. This format gave the participants the chance to request feedback regarding their performance of a novel motor task. In an attempt to generalize Deci and Ryan's research into a more athletic setting, a novel basketball shooting task was tested. The participant's practiced the non-dominant hand hook shot over three 20 min sessions. Additionally, the possible mediating effects of anxiety on intrinsic motivation were also examined. Measures of performance, technique, skill acquisition, behavioral and self-report measures of intrinsic motivation, and anxiety were evaluated.

Overall the results supported the cognitive evaluation theory (Deci & Ryan, 1980, 1985, 1991). The performance, technique, and acquisition findings all supported cognitive evaluation theory's prediction regarding the differentiation between informational and controlling feedback. Indeed, all of these measures revealed that the self-initiated informational feedback group scored higher on performance, technique, and acquisition scores in comparison to the other four experimental groups.

A behavioral measure of intrinsic motivation was collected using a 5 min free-choice measure. These data provide strong support for cognitive evaluation theory (Deci & Ryan, 1980, 1985, 1991), results reveal that the self-initiated informational feedback group spent significantly more time on the free-choice measure than the no-feedback control group. Additionally, both of the controlling feedback groups spent significantly less time on the targeted behavior than the no-feedback control group. Therefore, providing strong support for the hypothesized position regarding the detrimental effect of controlling feedback on intrinsic motivation and the increase in intrinsic motivation expected as a result of informational feedback.

Additional theoretical support comes from the results concerning the amount of feedback requested by the self-initiated informational and self-initiated controlling feedback groups. These results indicated that the informational feedback requested significantly more feedback than the controlling feedback group. Providing more support for cognitive evaluation theory's (Deci & Ryan, 1980, 1985, 1991; Kast & Conner, 1988; Koestner et al., 1983; Ryan et al., 1983; Vallerand & Ried, 1984) assumption regarding the need of individuals to be self-determined, by revealing group differences when affording the participants the opportunity to exert control over their own environment.

More support of cognitive evaluation theory (Deci & Ryan, 1980, 1985, 1991; Kast & Conner, 1988; Koestner et al., 1983; Ryan et al., 1983; Vallerand & Ried, 1984) comes from the questionnaire data examining participants perceptions of competence. Both the IMI and AFS subscales revealed theoretically expected results. The self-initiated informational feedback group competence scores increased over the three sessions, the no-

feedback control group's competence scores were reduced over the three sessions and the other experimental group's competence scores remained relatively unchanged.

Contrary findings for cognitive evaluation theory were also identified. Research results from the self-report data of the subscales of interest-enjoyment (IMI) and self-determination (AFS) failed to identify any significant theoretically expected differences. Theoretically driven hypotheses proposed that the experimental groups receiving informational feedback self-determination would score significantly higher on these subscales than groups receiving controlling feedback which is suggested to decrease perceptions of self-determination and in turn reduce intrinsic motivation. The correlation results conducted between the behavioral and subjective measures of intrinsic motivation also leads to continued questioning of how intrinsic motivation has been operationalized. Overall, the findings of this research are interpreted as supporting cognitive evaluation theory.

Reeve and Deci (1996) stated that cognitive evaluation theory may be influenced by outside variables. This research hypothesized that anxiety as proposed by Jones (1991) in a multidimensional model perhaps influences feedback and in turn motivation. This attempt to understand the mitigating effect of anxiety on the interpretation of feedback and intrinsic motivation was also unsuccessful. While some significant contrast results were found they were not strong enough to provide substantial support for any mediation of intrinsic motivation through the facilitative/debilitative interpretation of either cognitive or somatic anxiety.

When considering Reeve and Deci's (1996) position, perhaps the most interesting and unexpected result of this research involved the significant differences in the tension measures. These results were also peculiar because of the high positive correlation levels with the anxiety measures. Yet, the anxiety measures were not as robust as had been hypothesized. Therefore, it should be noted that tension levels were significantly effected by the differentiation of informational and controlling feedback. Indeed, both tension measures revealed significant differences over all three session. The externally initiated feedback groups scored significantly higher on the tension scores when compared to the no-feedback control group. Perhaps indicating a detriment in self-determination and in turn an increase in tension associated with the participants lack of control over the initiation of feedback.

Conclusions

Based on the results of the present study, the following conclusions are warranted:

1. There is evidence for the distinctive effects of informational and controlling feedback. Individuals afforded the opportunity to regulate their own learning environment by requesting informational feedback scored higher on performance, technique, and acquisition measures.
2. When individuals are given the opportunity to self-regulate their own learning environment and afforded informational feedback they exhibit higher levels of intrinsic motivation as indicated by the behavioral measure. The self-initiated informational feedback group spent significantly more free-choice time on the non-dominant hand task.

3. Individuals who received informational feedback requested more feedback than individuals receiving controlling feedback. Significantly more feedback was requested initially by the self-initiated informational feedback group in comparison to the self-initiated controlling feedback group.

4. The inability to exert control over an individual's learning environment caused an increase in perceptions of tension. During all three sessions the externally initiated feedback groups perceived greater levels of tension than the other experimental groups.

5. As individuals progress through the stages of the acquisition of expertise they reduced the amount of feedback requested. Participant's in the self-initiated informational feedback group reduced the amount of feedback they requested meanwhile, their performance and technique scores increased.

Suggestions for Future Research

This research tested theoretical assumptions of cognitive evaluation theory within a sport context (Deci & Ryan, 1980, 1985, 1991). As a result of this comprehensive study and in light of the results the following implications for future research are offered:

1. The subjective self-report data concerning the participant's interest-enjoyment and self-determination failed to reveal any significant differences as predicted by cognitive evaluation theory (Deci & Ryan, 1980, 1985, 1991; Frederick & Ryan, 1995; Kast & Conner, 1988; Koestner et al., 1983; Reeve & Deci, 1996; Ryan et al., 1983; Vallerand & Ried, 1984). These inconsistent findings are impetus for the clarifying the operationalization of intrinsic motivation and self-determination. A clarification of these

constructs in relation to the behavioral measure of intrinsic motivation will reveal important information concerning the cause of the detrimental effects of differentiated feedback.

2. This research examined the effects of self-versus externally initiated feedback on such measures as performance and technique. An examination of the results identify that informational feedback groups' outperformed controlling feedback groups. However, the self-initiated feedback groups' technique scores were higher than the externally initiated feedback groups. Past research has offered support for both of these findings concerning the differentiation of informational and controlling feedback (Ryan, 1982; Kast & Conner, 1988) and the self-regulation of feedback information (Janelle et al., 1997; Janelle, et al., 1995). The present inconsistent results could be clarified through the direct examination of these factors. This comparison could partial out when each factor (self-versus externally initiated; informational versus controlling feedback) is most critical for the acquisition of skill.

3. This research investigated the effect of a self-regulatory schedule on intrinsic motivation. Future research should continue to examine self-regulated feedback groups as well as an individual's initial motivational orientation towards a task (Sansone & Harackiewicz, 1998).

4. Jones' (1991, 1995) theory concerning the facilitative/debilitative effects of anxiety failed to be supported as a mediating factor behind the detrimental effects of feedback on intrinsic motivation. However, levels of perceived tension were differentially influenced by feedback set. Therefore, further examination of the relationship between

measures of anxiety and tension are warranted. As well as the factors behind the elevated tension levels found in this study.

In summary, this research provided support for the differentiated effect of self-initiated feedback, externally initiated feedback, informational feedback, and controlling feedback on measures of performance, technique, acquisition, and the behavioral measures of self-determination and intrinsic motivation. However, this study failed to support the theoretically driven hypotheses concerning the subjective measures of intrinsic motivation, self-determination, and the mediating effects of anxiety. Therefore, further studies should examine the operationalization of intrinsic motivation and the discriminating influences of feedback. In addition, the examination of the possible underlying constructs altering intrinsic motivation such as anxiety and tension could reveal interesting relationships. Finally, the inclusion of individual differences which may directly influence perceptions of behaviors and intrinsic motivation are warranted. Because of the critical role that intrinsic motivation plays in the acquisition of expertise, this direction of research is crucial in the development of a better understanding of the mechanisms underlying the development of intrinsic motivation.

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APPENDIX A LIMITATIONS

Possible limitations of the study are as follows:

1. The IMI might not have been effective in identifying participants intrinsically motivated in the task. Pilot data were collected with a general form of the IMI, and it did not differentiate participants within conditions and when compared in the use of free-choice time. To overcome this problem a more task-specific form of the IMI was administered.
2. The intertrial interval time trials were controlled by the experimenter and not the participant. However, pilot research data indicated that the 15 s intertrial interval was adequate for the participants to process the feedback comfortably.
3. Performance in the task was influenced by one's innate ability to incorporate footwork, a ballistic jump, and fine motor control to properly shoot the basketball with the non-dominant hand. Therefore, participants were randomly distributed to groups.
4. The utilization of heart rate as an indirect measure of physiological arousal may be limited because of the aerobic nature of the task. Because of the minimal aerobic component involved in the task the confound of the task should have been minimal.
5. A broad spectrum of participants were included in this study. Some participants may have extensive basketball experience. To control for this possible confound, a non-

dominant hand task was chosen. In addition, individuals enrolled in sport and fitness courses other than basketball were recruited to minimize the effects of practice.

APPENDIX B DEFINITION OF TERMS

Amotivation is the state when the initiation and control of behaviors are perceived as being beyond personal intentional control.

Cognitive anxiety is characterized by the awareness and concern of unpleasant feelings and the consequences of failure (Rotella & Lerner, 1993).

Controlling feedback is feedback that is perceived as external pressure to perform in a specific manner; it reduces the perception of autonomy and facilitates the perception of an external locus causality (Deci & Ryan, 1985).

Extrinsic motivation is the participation in an activity as a means to an end in attaining an outcome (such as a reward).

Informational feedback is feedback that is perceived as affording the individual a choice and that provides useful information regarding how to better interact with the environment; it also supports autonomy by increasing perceptions of an internal locus of causality (Deci & Ryan, 1985).

Intrinsic motivation reflects involvement with and/or the desire to achieve in a task to exhibit competence and self-determination, in the absence of an external reward or reinforcement.

Knowledge of performance refers to the terminal kinematic feedback related to the quality of the movement pattern demonstrated.

Reinforcement is any stimulus or event that leads to the increased frequency of a behavior.

Somatic anxiety is the perception of physiological arousal such as increased heart rate, shakiness, sweating, rapid respiration, and “butterflies” (Martens et al., 1990).

Self-Initiated feedback refers to the participant requesting verbal kinematic information from the experimenter concerning one’s technical performance during the execution of the task.

APPENDIX C

INFORMATIONAL FEEDBACK

Select the appropriate performance feedback:

- You did very well on that one.
- You did fairly well on that one.
- Let's see you did well that time.

Select the appropriate knowledge of performance feedback:

- Next time, you stand with your back to the basket on the right edge of the key (when facing the basket).
- Next time, start with your feet shoulder-width apart and knees flexed.
- Next time, with your left hand you dribble two times moving to the center of the key. You do this by leading with your right foot, stepping with your left foot and then jumping off your right foot.
- Next time, when you jump off your right foot you point your right shoulder at the basket, with your left arm you bring the ball straight up from your hip to full extension directly over your ear.
- Next time, with the ball you let it roll off your fingertips so the shot is soft with backspin.

APPENDIX D CONTROLLING FEEDBACK

Select the appropriate performance feedback:

- You did very well on that one, just as you should.
- You did fairly well on that one, just as you should.
- Let's see you did well that time, just as you should.

Select the appropriate knowledge of performance feedback:

- Next time, you should stand with your back to the basket on the right edge of the key (when facing the basket).
- Next time, your feet should be shoulder-width apart and knees flexed.
- Next time, with your left hand you should dribble two times moving to the center of the key. You should do this by leading with your right foot, stepping with your left foot and then jumping off your right foot.
- Next time, when you jump off your right foot you should point your right shoulder at the basket, with your left arm you should bring the ball straight up from your hip to full extension directly over your ear.
- Next time, with the ball you should let it roll off your fingertips so the shot is soft with backspin.

APPENDIX E ACTIVITY FEELING STATES SCALE

Directions: For each item listed below, consider how shooting left-handed hook shots make you feel at the present time. If you strongly agree the shooting left-handed hook shots makes you feel that way, circle a number near 7. If you strongly disagree with the item, circle a number near 1. If you agree and disagree equally, circle a number near 4.

Shooting left-handed hook shots makes me feel...

	Strongly Disagree			Agree & Disagree Equally			Strongly Agree	
Capable	1	2	3	4	5	6	7	
Offered Choices What to Do	1	2	3	4	5	6	7	
Part of a Team	1	2	3	4	5	6	7	
Stressed	1	2	3	4	5	6	7	
Free	1	2	3	4	5	6	7	
Involved with Friends	1	2	3	4	5	6	7	
Pressured	1	2	3	4	5	6	7	
Competent	1	2	3	4	5	6	7	
I Want to Do This	1	2	3	4	5	6	7	
Uptight	1	2	3	4	5	6	7	
Brotherly/Sisterly	1	2	3	4	5	6	7	
Achieving	1	2	3	4	5	6	7	
My Participation is Voluntary	1	2	3	4	5	6	7	

APPENDIX F INTRINSIC MOTIVATION INVENTORY

Using the scale below, please indicate to what extent you agree with each of the following items.

1. I enjoy this non-dominant hand hook-shot game very much.
 Strongly disagree Strongly agree
 1 2 3 4 5 6 7
2. I think I am pretty good at this non-dominant hand hook-shot.
 Strongly disagree Strongly agree
 1 2 3 4 5 6 7
3. I put a lot of effort into this non-dominant hand hook-shot.
 Strongly disagree Strongly agree
 1 2 3 4 5 6 7
4. It was important to me to do well at the non-dominant hand hook-shot.
 Strongly disagree Strongly agree
 1 2 3 4 5 6 7
5. I felt tense while shooting this non-dominant hand hook-shot.
 Strongly disagree Strongly agree
 1 2 3 4 5 6 7
6. I tried very hard while playing this non-dominant hand hook-shot game.
 Strongly disagree Strongly agree
 1 2 3 4 5 6 7
7. Playing the non-dominant hand hook-shot game was fun.
 Strongly disagree Strongly agree
 1 2 3 4 5 6 7
8. I would describe the non-dominant hand hook-shot game as very interesting.
 Strongly disagree Strongly agree
 1 2 3 4 5 6 7

9. I felt pressured while playing shooting the non-dominant hand hook-shot.
Strongly disagree Strongly agree
1 2 3 4 5 6 7
10. I was anxious while playing the non-dominant hand hook-shot game.
Strongly disagree Strongly agree
1 2 3 4 5 6 7
11. I did not try very hard when shooting the non-dominant hand hook-shot.
Strongly disagree Strongly agree
1 2 3 4 5 6 7
12. After playing the non-dominant hand hook-shot game for a while I felt pretty competent.
Strongly disagree Strongly agree
1 2 3 4 5 6 7
13. I was very relaxed shooting the non-dominant hand hook-shot.
Strongly disagree Strongly agree
1 2 3 4 5 6 7
14. I am pretty skilled at the non-dominant hand hook-shot.
Strongly disagree Strongly agree
1 2 3 4 5 6 7
15. This non-dominant hand hook-shot did not hold my attention.
Strongly disagree Strongly agree
1 2 3 4 5 6 7
16. I could not play this non-dominant hand hook-shot game very well.
Strongly disagree Strongly agree
1 2 3 4 5 6 7
-

APPENDIX G COMPETITIVE STATE ANXIETY INVENTORY -2

Directions: A number of statements which individuals have used to describe their feelings before participation are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate *how you feel right now* - at this moment. There are no right or wrong answers. Do *not* spend too much time on any one statement, but choose the answer which describes your feelings *right now*.

	Not at All	Somewhat	Moderately So	Very Much So
1. I am concerned about this competition.	1	2	3	4

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

2. I feel nervous	1	2	3	4
-------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

3. I feel at ease	1	2	3	4
-------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

4. I have self-doubts	1	2	3	4
-----------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

	Not at All	Somewhat	Moderately So	Very Much So
5. I feel jittery	1	2	3	4

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

6. I feel comfortable	1	2	3	4
-----------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

7. I am concerned that I may not do as well as I should	1	2	3	4
--	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

8. My body feels tense	1	2	3	4
------------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

9. I feel self-confident	1	2	3	4
--------------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

10. I am concerned about failing	1	2	3	4
----------------------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

	Not at All	Somewhat	Moderately So	Very Much So
11. I feel tense in my stomach	1	2	3	4

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative					Very facilitative
-3	-2	-1	0	+1	+2 +3

12. I feel secure	1	2	3	4
-------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative					Very facilitative
-3	-2	-1	0	+1	+2 +3

13. I am concerned about choking under pressure	1	2	3	4
--	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative					Very facilitative
-3	-2	-1	0	+1	+2 +3

14. My body feels relaxed	1	2	3	4
---------------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative					Very facilitative
-3	-2	-1	0	+1	+2 +3

15. I'm confident I can meet the challenge	1	2	3	4
--	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative					Very facilitative
-3	-2	-1	0	+1	+2 +3

16. I'm concerned about performing poorly	1	2	3	4
---	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative					Very facilitative
-3	-2	-1	0	+1	+2 +3

	Not at All	Somewhat	Moderately So	Very Much So
17. My heart is racing	1	2	3	4

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

18. I'm confident about performing well	1	2	3	4
---	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

19. I'm worried about reaching my goal	1	2	3	4
--	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

20. I feel my stomach sinking	1	2	3	4
-------------------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

21. I feel mentally relaxed	1	2	3	4
-----------------------------	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

22. I'm concerned that others will be disappointed with my performance	1	2	3	4
---	---	---	---	---

Does this symptom facilitate or debilitate your subsequent performance?

Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

			Not at All	Somewhat	Moderately So	Very Much So
23. My hands are clammy			1	2	3	4
Does this symptom facilitate or debilitate your subsequent performance?						
Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3
24. I'm confident I won't be able to concentrate			1	2	3	4
Does this symptom facilitate or debilitate your subsequent performance?						
Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3
25. I'm concerned I won't be able to concentrate			1	2	3	4
Does this symptom facilitate or debilitate your subsequent performance?						
Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3
26. My body feels tight			1	2	3	4
Does this symptom facilitate or debilitate your subsequent performance?						
Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3
27. I'm confident of coming through under pressure			1	2	3	4
Does this symptom facilitate or debilitate your subsequent performance?						
Very debilitative						Very facilitative
-3	-2	-1	0	+1	+2	+3

APPENDIX H
TECHNIQUE SCORING

Dribble _____
(Use of dominant hand -.10, only one dribble -.50, no dribble 0 points)

Footwork _____
(Opening of right foot, followed by step with left, and right, deduction of -.25 for missed steps or additions)

Position of right foot _____
(Right foot and shoulder at jump initiation should be pointed at the basket -.50 deduction)
Jump

Jump _____
(No jump 0 points, jump off left foot -.50 deduction)

Arm extension and backspin _____
(Failure to extend arm -.50 or impart backspin on the ball -.50)

Total _____
(Technique score out of 5 points)

Performance score _____
0 - airball
1 - backboard only
2 - hits rim low probability
3 - nearly goes in
4 - basket

APPENDIX I PILOT DATA

Performance

Pilot study data showed significant performance differences across the sessions. Specifically, across the first two sessions, participants improved from an average performance score of 84.00 ($SD = 18.29$) to 94.98 ($SD = 17.96$). Continued improvement was found in the third session ($M=102.75$, $SD = 16.47$). Additionally, males in the pilot study seemed to reach a learning plateau during the final session with scoring averages over the final four trial blocks of 25.6, 26.05, 27.09, and 27.35, respectively. The leveling off of performance scores is an indication of an increase in expertise. Therefore, the task should be appropriate to assess performance, learning, and amounts of feedback requested.

Technique

Pilot study results indicated that technique accuracy rates were reduced over the three sessions. These scores were reduced from 15.30 ($SD = 11.18$) during the first session to 11.10 ($SD = 11.23$) for the second session and the final session at 7.23 ($SD = 10.90$). The use videotaped in analyses should greatly improve the precision of the analysis on the quality of hook shots displayed by participants.

Free-Choice Measure

Pilot data indicated significant free-choice time group differences in the third session. During the third session, the self-initiated controlling feedback group, externally initiated informational and controlling groups, and the no-feedback control group were significantly different from the self-initiated informational feedback group ($M = 210.00$ s, $SD = 46.59$). The no-feedback control group averaged 85.00 s ($SD = 85.85$), the externally initiated informational feedback group averaged 60.00 s ($SD = 71.71$), the self-initiated controlling feedback group averaged 39.38 s ($SD = 65.60$), and the externally initiated controlling feedback group averaged 33.75 s ($SD = 63.00$). Using the no-feedback control group as a baseline measure, because it was not manipulated by differentiated feedback set, the effect of the treatments was more obvious, self-initiated informational feedback = 125 s, externally initiated informational feedback = - 15 s, externally initiated controlling feedback = -33.75 s, and self-initiated controlling feedback = - 45.62 s, respectively.

Self-Initiated Feedback

Pilot data findings indicated that there was a significant difference in the frequency of feedback requested by the self-initiated informational feedback group. These participants requested feedback nearly five more times per session than did the self-initiated controlling feedback group. The self-initiated informational group requested feedback an average of 6.25 times per session, while the self-initiated controlling feedback group requested feedback 1.55 times per session.

Intrinsic Motivation Inventory

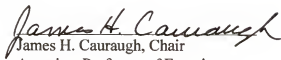
The pilot data indicated significant differences on two of the IMI subscales.

Significant differences in competence were revealed, as competence increased over the final two sessions. Additionally, effort and importance significantly increased over the three sessions. Specifically, competence increased from 3.59 (SD = 1.26) during the second session to 3.85 (SD = 1.26) during the third session. Effort and importance also increased across sessions: 4.66 (SD = 1.08), 4.96 (SD = 1.10), and 5.24 (SD = 1.12). However, these data failed to identify any significant group effect.


BIOGRAPHICAL SKETCH

Douglas A. Barba was born in San Diego California in 1962. Upon completion of the University of San Diego high school, he played professional baseball with the Cincinnati Reds and the New York Mets organizations from 1980 through 1985. He then completed his bachelor's and master's degrees in psychology at United States International University while coaching baseball at the University, after which he began his doctoral studies at the University of Florida. Currently, Doug is living with his wife Laura, and sons Gavin and Samuel, in San Diego.


I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


James H. Cauraugh, Chair
Associate Professor of Exercise
and Sport Sciences


I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


Christopher M. Janelle
Associate Professor of Exercise
and Sport Sciences

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

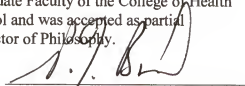

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Associate Professor of Exercise
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


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This dissertation was submitted to the Graduate Faculty of the College of Health and Human Performance and to the Graduate School and was accepted as partial fulfillment of the requirements of the degree of Doctor of Philosophy.

December 1998


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